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Research Article

Anxiety, Depression, Social Support, Needs, and Concerns of Frontline Nurses during COVID-19 Peak Infection Period: A Cross-Sectional Multicenter Study

Liuyi Zhang ¹, Kemei Zhang ², Li Tong ³, Yafen Guo ³, Jinhua Shen ³,
Xue-qing Zhang ³, and Pan Yang ¹

¹Department of Nursing, Medical College of Hunan Normal University, Changsha, 410013, Hunan, China

²Ophthalmology Ward II, Changde Hospital, Xiangya School of Medicine,

Central South University (The First People's Hospital of Changde City), Changde, 415000, Hunan, China

³Department of Nursing, Changde Hospital, Xiangya School of Medicine,

Central South University (The First People's Hospital of Changde City), Changde, 415000, Hunan, China

Correspondence should be addressed to Xue-qing Zhang; 382731326@qq.com

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Background. The worldwide pandemic of COVID-19 had put enormous pressure on frontline healthcare workers. In December 2022, China released its “10 new measures,” signaling the end of the “dynamic zero COVID-19 strategy.” This triggered a period of peak infection, which shocked China’s healthcare system and affected the mental health of nurses. **Objective.** To explore the anxiety, depression, and social support levels of frontline nurses during the peak period of COVID-19 infection and to identify the main needs and concerns of nurses during this period. **Design.** A multicenter cross-sectional study. **Settings.** 18 hospitals of different grades in three cities in Hunan Province from December 21, 2022, to January 10, 2023, the peak period of COVID-19 infection. **Participants.** A total of 4,160 nurses completed the survey. **Methods.** The questionnaire included general information, symptoms, the preparation for nurses, GAD-7, PHQ-9, PSSS, and two open-ended questions investigating nurses’ needs and concerns. General linear models were used to analyze the factors influencing anxiety. Hospital preparation for nurses, nurses’ needs, and nurses’ concerns were categorized and subjected to frequency counts. **Results.** The median (P25, P75) scores for anxiety and depression among nurses were 7.00 (3, 12) and 8 (3, 12), respectively. Type of hospital, professional title, family structure, isolation staff lounge preparation, ibuprofen preparation, health status of parents, fever, chest distress, dyspnea, cough, insufficient protective equipment, number of children, and PSSS others were the influencing factors of GAD grades. The top 3 needs were free drugs and treatments (78.71%), shift breaks and paid leave (77.66%), and understanding and supports from hospitals and families (75.99%). The first three concerns were the fear of spreading the disease to family members (83.89%), the after-effects of infection (65.67%), and cross-infection with colleagues and patients (61.70%). **Conclusions.** Nurses’ anxiety was more severe during peak infection period. Overloaded work schedules and insufficient sleep became a common situation. Worries about family members became the main concern of nurses. Managers should make contingency plans for public health emergencies and provide frontline nurses with protective equipment, stress-relieving measures, and a rotation system. More importantly, they should pay attention to the needs of nurses’ family members and provide medical and care support. The media should also explain how hospitals operate and carry out their duties during these extraordinary times in order for the public to comprehend the condition of frontline epidemic fighters.

1. Introduction

The COVID-19 worldwide epidemic had lasted for three years since the outbreak was reported in central China's Wuhan city in December 2019. Because of the differences in social cultural, political, and economic contexts in different countries, there has been no consensus prevention policy about the public health strategy for COVID-19. Before December 7, 2022, the Chinese government had adopted a "dynamic zero COVID-19 strategy" to control the pandemic, in which restrictive measures were initiated and maintained until there were no documented COVID-19 cases in a particular geographic location [1]. In this period, facing with COVID-19 epidemic such as a catastrophic health emergency, the mental health status of frontline medical staff deserves attention [2]. Studies [3, 4] have shown that the prevalence of anxiety, depression, and sleep disorders among Chinese medical professionals during the epidemic ranged from 44.6% to 81.36%, 45.76% to 50.4%, and 34.0% to 97.88%, respectively. To deal with the situation, a national guideline for psychological crisis intervention for COVID-19 was released by the Chinese National Health Commission, marking the beginning of China's efforts to offer medical professionals' full psychological protection [5].

However, on December 7, 2022, the China National Health Commission issued "10 new measures" to further optimize the implementation of prevention and control of the COVID-19 epidemic [6]. The "10 new measures" required scientific and precise delineation of risk areas to minimize the impact of the epidemic on economic and social development, which indicated that China had relaxed its strict COVID-19 prevention and control measures. Thus, widespread infection—including among frontline medical personnel—was unavoidable. There were 13.983 million medical professionals working in China at that time, including 5.018 million registered nurses and 4.287 million practicing physicians and physician assistants [7]. Therefore, there would be more risk and strain on healthcare facilities and medical staff as a result of the new policy shift. Considering that previous research has found that during the COVID-19 pandemic, medical staff self-reported high rates of anxiety and depression symptoms, and psychological interventions for those at high risk of psychological disorders should be integrated into the work plan to fight the pandemic [8].

Most COVID-19 cases were mild. After infection, some people might not even exhibit any clinical symptoms [9]. On the other hand, a few people could develop a severe COVID-19 case. Age, gender, obesity, smoking, and comorbidity chronic diseases like hypertension, type 2 diabetes mellitus, and others were key risk factors [10, 11]. Yet, the population's immunity had further decreased due to the "immunization debt" caused by mask-wearing and reduced sociability policies that China had imposed over the past three years [12], as well as the country's rapidly aging population, which some had dubbed an "aging tsunami" [13]. These factors, in addition to China's huge population, fostered tremendous challenges for healthcare.

According to data released on the official website of the China Center for Disease Control and Prevention (CDC)

[14], the number of infections peaked around December 22, 2022, with a maximum of over 7 million new infections per day. The number of fever outpatient (clinic) visits nationwide (excluding Hong Kong, Macao, and Taiwan) peaked on December 23, 2022, at 2.867 million visits. The number of severely ill patients among newly coronavirus-infected patients in hospitals nationwide increased by nearly 10,000 per day from December 27, 2022, to January 3, 2023, and then decreased significantly on January 4 before reaching a peak of 128,000 on January 5th. The number of deaths from new coronavirus infections in hospitals reached a daily peak of 4,273 on January 4th. Such a large number of patients was undoubtedly an overload for healthcare workers, especially when they themselves were infected. The impact of such a large-scale infection in a short period of time on China's healthcare system was enormous and undoubtedly posed a huge challenge to the physical and psychological limits of medical workers [15].

This daunting task might cause not only significant psychological stress but also a shift in working state [16], especially in specific COVID-19 units and emergency departments [17]. Burnout, intentions to leave [18], and compassion fatigue [19] would emerge, especially in the absence of psychological counseling and professional support. Furthermore, sleep deprivation caused by heavy work might impair emotional awareness, resulting in decreased levels of empathy [20]. The situation seems even less promising in Chinese collectivist cultures. Collectivism requires a greater focus on the feelings of others and therefore risks neglecting one's own requirements [21]. Therefore, we need to focus on and enhance support for healthcare workers so that they can become aware of their emotions and can help them remain productive and focused during stressful events of a pandemic [22].

Nevertheless, studies on the psychological state and social support of medical staff during the COVID-19 peak infection period remained mostly unexplored, particularly in light of the large number of infections with COVID-19 and a shortage of medical staff in China. Therefore, this study aimed to investigate the anxiety, depression, stressors, social support, and needs of frontline nurses during COVID-19 peak infection period in China. This will provide the groundwork for healthcare workers' social support and psychological intervention during an epidemic.

2. Methods

2.1. Study Design. A multicenter cross-sectional survey was conducted in 18 hospitals in three cities: Changde, Changsha, and Chenzhou in northern, central, and southern Hunan Province in southcentral China, from December 21, 2022, to January 10, 2023, the COVID-19 peak infection period after the release of "10 new measures" by the Chinese government.

2.2. Settings. Randomized stratified sampling was used to select hospitals. First, three cities from the north, center, and south of Hunan Province were chosen. Then, six hospitals or

community health centers were randomly selected from each city, respectively. Among them, two were tertiary, two were secondary, and two were community hospitals. In all, eighteen hospitals in the three cities were selected. Following that, one emergency room, ICU, surgery, and medical department were chosen at random from each tertiary and secondary hospital. The survey was distributed to all of the nurses in the chosen department who met the criteria. Since there were not enough community nurses, the study included all of those who met the criteria. The specific process is shown in Figure 1.

2.3. Participants and Sample Size. Nurses were included in the study if they (1) were registered nurses; (2) were on duty; (3) did not have serious psychiatric disorders, such as schizophrenia and depression; and (4) gave informed consent to participate in this study. The exclusion criteria were (1) being on vacation or undergoing a training course in another hospital during the data collection period and (2) recently experiencing a major psychiatric event, such as divorce and death of a family member.

The sample size was calculated using the method of 10 EPV (events per variable) [23]. A total of 26 variables were analyzed in the influential factors of anxiety in this study, so at least 260 nurses with severe anxiety were needed. According to the references, the prevalence of severe anxiety among nurses during the COVID-19 epidemic was 3.1% [24], 4.5% [25], and 17.2% [26], respectively. In addition, we used a mean value of 8%. Therefore, at least $(260/0.08) = 3250$ nurses need to be surveyed. Assuming a 20% of attrition, we will recruit a minimum of 4063 participants.

2.4. Outcome Measures. The questionnaire included seven parts: demographic information, the preparation of the medical staff before the implementation of “10 new measures,” the patient health questionnaire 9, the general anxiety disorder 7, the perceived social support scale, the needs of nurses, and the concerns of nurses during COVID-19 peak infection period.

2.4.1. Sociodemographics and Symptoms of Infection. This part collected the nurses' gender, age, hospital classification, hospital category, professional title, marital status, education, vaccination, family structure, health status of parents, number of children, and whether nurses showed symptoms of infection (e.g., fever, malaise, and respiratory distress).

2.4.2. The Preparation for the Nurses. This part investigated what hospitals prepared for the nurses and their families, such as isolation staff lounge preparation, drugs preparation, children, and parents care preparation (e.g., medication emergency kits for the elderly and children) after the “10 new measures” implementation.

2.4.3. General Anxiety Disorder 7 (GAD-7). The GAD-7 is a seven-item self-report scale that assesses anxiety, which was developed by Spitzer et al. [27] and translated into

Chinese by He et al. [28]. Each item is scored from 0 to 3, with a total score ranging from 0 to 21. Anxiety symptoms can be categorized into four degrees based on total scores [28, 29]: no anxiety (≤ 4 points), mild (5–9 points), moderate (10–14 points), and severe anxiety (≥ 15 points). The GAD-7 is a reasonably accurate screening tool for anxiety disorders and symptoms, according to numerous research. In the current study, Cronbach's alpha for the GAD-7 was 0.80.

2.4.4. Patient Health Questionnaire 9 (PHQ-9). The PHQ-9 is a nine-item self-report measure that was developed by Kroenke et al. to assess depression symptoms [30]. The score of each item ranges from 0 to 3, and the total score ranges from 0 to 27. Symptom severity according to the total score can be divided into four grades: mild (5–9 points), moderate (10–14 points), moderately severe (15–19 points), and severe depression (≥ 20 points) [31]. The scale was shown to have good reliability and validity. The Chinese version translated by Chen et al. [32] was used in this study. Cronbach's alpha for the scale in the present study was 0.84.

2.4.5. Perceived Social Support Scale (PSSS). Zimet et al. [33] created the 12-item self-report measure that evaluates how much social support one receives from friends, family, and significant others on a subjective level. Every item is rated using a 7-point Likert scale. Total scores of 12–36 indicate a low level of support, 37–60 suggest an intermediate level of support, and 61–84 show a high level of support. The Chinese version translated by Chou [34] was used in this study. Cronbach's alpha coefficient for the total PSS was 0.89 in this study.

2.4.6. The Needs of Nurses. Nurses were asked to list up to five of their most pressing needs in response to an open-ended question to assess their circumstances while working on the front line of the epidemic fight.

2.4.7. The Concerns of Nurses. This section was also an open-response section that asked the frontline nurses to provide up to 5 of their current top concerns.

2.5. Data Collection. The anonymous self-assessment questionnaire for the survey was prepared using an online crowdsourcing platform in mainland China (<https://www.wjx.cn>), and it was sent to nurses via the Internet. Each hospital had a dedicated trained researcher assigned to it for quality control, data collecting, and hospital-to-hospital communication.

2.6. Statistical Analysis. Statistical descriptions and analyses were conducted for quantitative information using SPSS 26.0 for Windows (SPSS, Chicago, IL, USA). Normally distributed measures were presented as Mean (SD), and nonnormally distributed information was presented as Median (P25, P75). A generalized linear model (GLM) was used to explore factors leading to anxiety. All analyses were performed using a two-sided test $P < 0.05$. Answers to open-response questions were categorized by researchers.

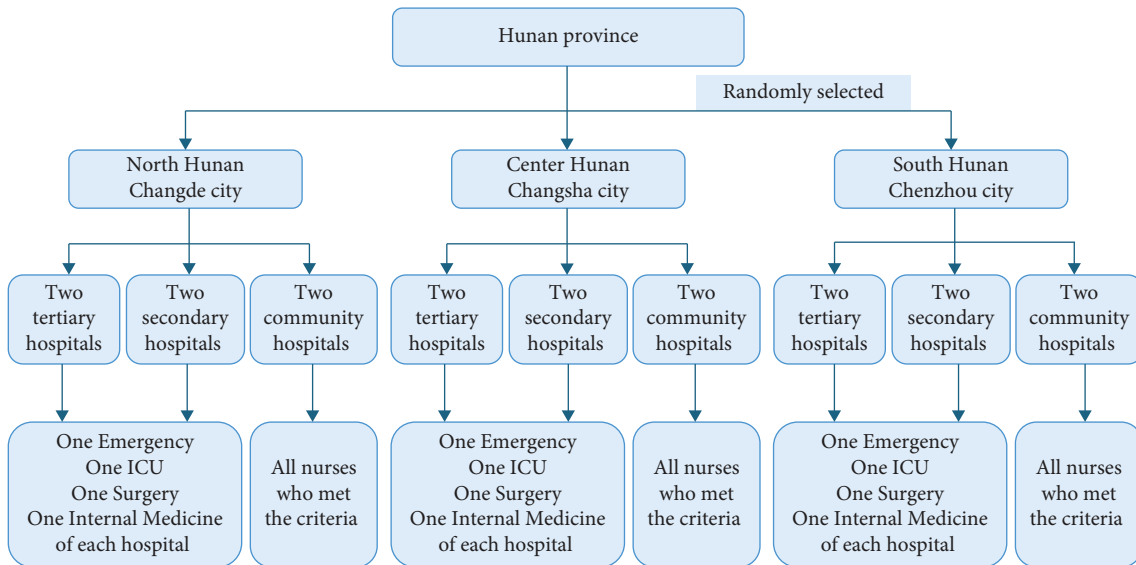


FIGURE 1: Flowchart of selecting settings.

2.7. Ethics Approval and Consent. The study was approved by the Ethics Committee of the Hospital (No. 2023-005-01). A covering letter explaining the objectives of the research and data privacy policies was given with the questionnaires distributed to the nurses. It was emphasized that participation was entirely voluntary and that completing the questionnaire or not would not affect their work and life in any way. The informed consent page presented two options (yes/no). Only participants who chose yes were taken to the questionnaire page, and participants could quit the survey at any time. To ensure data protection and confidentiality, codes were used for each hospital and participants were completely anonymous.

3. Results

3.1. Characteristics, Anxiety, Depression, and Social Support of Nurses. A total of 4,379 nurses met the inclusion criteria, and finally, 4,160 nurses responded and completed the questionnaire from December 21, 2022, to January 10, 2023. After excluding invalid questionnaires (e.g., choosing the same answer for all questions, or illogical responses, such as age 120 years), 4,128 valid questionnaires were finally included. The response rate was 95.00%, and the validity rate was 99.23%. The median (P25, P75) scores for anxiety, depression, and perceived social support among nurses were 7.00 (3, 12), 8 (3, 12), and 63 (52, 72), respectively. Higher GAD scores were reported by nurses who were females, worked at general hospitals or tertiary-level hospitals, held midlevel job titles, were divorced, held a bachelor's degree, were unvaccinated, belonged to three-generation households, had two or more children, and both parents were in poor health, while lower PHQ scores were reported among nurses in primary or community hospitals, senior nurses, widowed nurses, nurses with doctoral degrees, nurses who had completed vaccinations, nurses who lived alone, nurses whose parents were both in good health, and nurses who had no children. Additionally, higher PSSS scores were noted for

tertiary-level hospital nurses, general hospital nurses, nurses in senior positions, married nurses, nurses with a small family structure or couples living together, nurses with both parents in good health, and nurses with two children.

Demographic characteristics and the anxiety, depression, and perceived social support scores of nurses are shown in Table 1.

3.2. Nucleic Acid Test Results and Symptoms of Nurses. Nucleic acid tests were reported positively by 1532 (37.11%) nurses and negatively by 1338 (32.41%) nurses. Besides, 1258 nurses (30.47%) did not perform a nucleic acid test. The partitions of the chi-square method were used to compare each group's nurses' vaccination completion rates. A statistically significant difference in vaccine completion rates was identified between nurses with positive nucleic acid test results with symptoms versus those with negative test results and without any symptoms. The comparison of nucleic acid test findings with symptoms and vaccination implementation is shown in Table 2.

As for the specific symptoms, dyspnea was the most reported symptom, occurring in 89.07% of nurses. 90.75% (3746/4128) of the nurses reported at least one infection-related symptom, such as chest tightness and fever. Table 3 shows the specific symptoms of nurses.

3.3. The Preparation for the Nurses. Hospitals' preparations for healthcare workers following the adoption of the "10 new measures" are shown in Figure 2. The most prepared were ibuprofen and acetaminophen at 54.89% and 54.41%, respectively, while the least prepared were antitussive medicines and protective equipment, with only 33.99% and 17.81%, respectively.

3.4. The Generalized Linear Model of Anxiety. The GAD data were converted into hierarchical categorical variables (none, mild, moderate, and severe anxiety) due to the GAD scores'

TABLE 1: Demographics, anxiety, depression, and social support of nurses.

	Total (n = 4128)	GAD		PHQ		PSSS	
		Median (P25, P75)*	Z/H(p) [§]	Median (P25, P75)*	Z/H(p) [§]	Median (P25, P75)*	Z/H(p) [§]
Age, year, median (P25, P75)*	33 (28, 40)	7.00 (3, 12)	—	8 (3, 12)	—	63 (52, 72)	—
Gender, n (%)							
Female	3984 (96.51%)	7.00 (3, 12)	-2.349 (0.019)	8 (3, 12)	-1.070 (0.285)	63 (52, 72)	-0.566 (0.572)
Male	144 (3.49%)	6 (1.25, 11)		8 (2, 12)		62 (48, 72.75)	
Level of hospital, n (%)							
Primary	405 (9.81%)	6 (2, 11)	9.822 (0.020)	6 (1, 10)	16.132 (0.001)	61 (48, 72)	60.403 (<0.001)
Secondary	1150 (27.86%)	7 (3, 11)		8 (4, 12)		60 (50, 71.25)	
Tertiary	2383 (57.73%)	7 (3, 12)		8 (3, 12)		65 (54, 72)	
Unclassified†	190 (4.60%)	7 (2, 13)		7 (3, 14)		59 (48, 72)	
Type of hospital, n (%)							
General hospital	3234 (78.34%)	7 (3, 12)	25.576 (<0.001)	8 (4, 12)	16.785 (<0.001)	64 (53, 72)	40.764 (<0.001)
Specialized hospital	363 (8.79%)	7 (3, 11)		8 (4, 12)		61 (50, 71)	
Community hospital	531 (12.86%)	6 (2, 11)		6 (2, 10)		59 (48, 72)	
Professional title, n (%)							
Senior	462 (11.19%)	5 (2, 9)	52.582 (<0.001)	6 (1, 9)	46.827 (<0.001)	67 (56, 73)	33.981 (<0.001)
Intermediate	1682 (40.75%)	7 (4, 13)		8 (4, 13)		64 (54, 72)	
Junior and below	1984 (48.06%)	7 (3, 12)		8 (3, 12)		61 (49, 72)	
Marital status, n (%)							
Unmarried	884 (21.41%)	6 (2, 10)	28.585 (<0.001)	7 (3, 11)	7.376 (0.061)	61 (49, 72)	17.317 (0.001)
Married	3132 (75.87%)	7 (3, 12)		8 (3, 12)		64 (53, 72)	
Divorced	100 (2.42%)	7 (2, 13.75)		8 (3, 14)		57 (48, 72)	
Widowed	12 (0.29%)	5 (0.25, 14.25)		7 (0.75, 11)		60 (45.25, 72)	
Education, n (%)							
College degree or below	1125 (27.25%)	6 (2, 10)	40.130 (<0.001)	7 (2, 11)	36.117 (<0.001)	62 (49, 72)	19.053 (<0.001)
Bachelor's degree	2845 (68.92%)	7 (4, 13)		8 (4, 12)		64 (52, 72)	
Master's degree	154 (3.73%)	6 (2, 9)		5 (1.75, 9)		68 (58, 73)	
Doctor's degree or above	4 (0.10%)	4 (0.75, 6.50)		3 (0, 9)		63.5(61.50, 66.25)	
Vaccination, n (%)							
No	343 (8.31%)	7 (3, 14)	-2.153 (0.031)	8 (4, 14)	-2.297 (0.022)	63 (51, 72)	0.316 (0.752)
Yes	3785 (91.69%)	7 (3, 12)		8 (3, 12)		63 (52, 72)	
Family structure, n (%)							
Live alone	659 (15.96%)	6 (2, 11)	72.808 (<0.001)	7 (2, 11)	37.079 (<0.001)	60 (48, 72)	24.246 (<0.001)
Live with colleagues or friends	345 (8.36%)	7 (2.5, 11)		7 (3, 11)		62 (49, 72)	
Husband and wife	595 (14.41%)	7 (3, 11)		7 (3, 11)		65 (53, 72)	
Small family	1370 (33.19%)	7 (3, 12)		7 (3, 12)		65 (53, 72)	
Three-generation family	1159 (28.08%)	7 (4, 14)		8 (4, 13)		62 (52, 72)	
Health status of parents, n (%)							
Healthy	2050 (49.66%)	6 (2, 10)	106.364 (<0.001)	7 (2, 10)	89.595 (<0.001)	65 (52, 72)	26.643 (<0.001)
One unhealthy	877 (21.25%)	7 (4, 13)		8 (4, 12)		61 (51, 72)	
Both unhealthy	1201 (29.09%)	7 (4.5, 14)		9 (4, 14.5)		61 (52, 72)	
Number of children, n (%)							
No child	1397 (33.84%)	6 (2, 10)	66.436 (<0.001)	7 (2.50, 11)	36.095 (<0.001)	63 (51, 72)	3.471 (0.325)
One child	1750 (42.39%)	7 (3.75, 13)		8 (3, 12)		63 (53, 72)	
Two children	958 (23.21%)	7 (4, 14)		9 (4, 13)		64 (51, 72)	
Three children	23 (0.56%)	7 (4, 14)		8 (2, 11)		60 (48, 72)	

*GAD, PHQ, PSSS scores, and age did not fit the normal distribution and were expressed as medians. †Unclassified hospital: some small hospitals such as community health centers. ‡Z: Mann-Whitney U test (for two-categorical variables); H: Kruskal-Wallis one-way ANOVA test (for k-categorical variables).

TABLE 2: Nucleic acid test results and vaccine completion status.

Nucleic acid test results	Total $n = 4128$	Vaccination*		χ^2	P^\dagger
		Yes	No		
COVID-19 positive with symptoms	1434 (34.74%)	1297 (31.42%)	137 (3.32%)	Ref-	Ref-
COVID-19 positive with no symptoms	98 (2.37%)	92 (2.23%)	6 (0.15%)	1.2761	0.2586
COVID-19 negative with symptoms	1179 (28.56%)	1097 (26.57%)	82 (1.99%)	5.6902	0.0171
COVID-19 negative with no symptoms	159 (3.85%)	155 (3.75%)	4 (0.10%)	8.7876	0.0030
No nucleic acid test with symptoms	1133 (27.45%)	1027 (24.88%)	106 (2.57%)	0.0290	0.8649
No nucleic acid test with no symptoms	125 (3.03%)	117 (27.99%)	8 (0.19%)	1.3556	0.2443

*The full completion of vaccinations as required. † The partitions of χ^2 method were used. The control group consisted of nurses who tested positive for COVID-19 and reported symptoms. Test statistics values were considered statistically significant at $\alpha/2 (k - 1) = 0.005$.

TABLE 3: Specific symptoms of nurses.

Symptoms	Total $n = 4128$
<i>Dyspnea</i>	
No	651 (10.93%)
Yes	3477 (89.07%)
<i>Chest distress</i>	
No	637 (15.43%)
Yes	3491 (84.57%)
<i>Fever (over 39°C)</i>	
No	978 (23.69%)
Yes	3150 (76.31%)
<i>Cough</i>	
No	1462 (35.42%)
Yes	2666 (64.58%)
<i>Headache</i>	
No	1654 (40.07%)
Yes	2474 (59.93%)
<i>Fatigue</i>	
No	1918 (46.46%)
Yes	2210 (53.54%)

nonnormal distribution. Multivariate ordered logistic regression analyses were then carried out in a generalized linear model to examine the influence factors of GAD. GAD grades were analyzed as the dependent variable, meaningful demographics, hospital preparation for nurses, and whether nurses showed symptoms of infection were analyzed as independent variables. The results showed that type of hospital, professional title, family structure, isolation staff lounge preparation, ibuprofen preparation, health status of parents, fever, chest distress, dyspnea, cough, insufficient protective equipment, number of children, and PSSS others were the influencing factors of GAD grades. In contrast, gender, hospital grade, marital status, education level, and vaccination status were no longer statistically significant, see Table 4.

3.5. Nurses' Needs during COVID-19 Peak Infection Period. Figure 3 shows the major needs of nurses during COVID-19 peak infection period. The top three needs were free drugs and treatments (78.71%), shift breaks and paid leave (77.66%), and understanding and supports from hospitals and families (75.99%).

3.6. Nurses' Concerns during COVID-19 Peak Infection Period.

The main worries that nurses had during the COVID-19 peak infection period are depicted in Figure 4. The leading three concerns were the fear of spreading the disease to family members (83.89%), worry about the after-effects of infection (65.67%), and the fear of cross-infection with colleagues and patients (61.70%).

4. Discussion

This study examined the impacts of the Chinese government's release of the "10 new measures" and the cancellation of the "dynamic zero COVID-19 strategy" on the mental health of Chinese healthcare professionals during the rapid peak infection of COVID-19. Understanding the psychological issues and needs of frontline nurses during peak infection periods could help in the development of stress-relieving solutions for healthcare professionals, as well as mitigation strategies for future infectious disease pandemics or catastrophic disasters.

4.1. Psychological Pressure on Medical Staff Was Greater during Peak Epidemics. Medical staff will exhibit psychological symptoms including mental health conditions like anxiety and depression when faced with an outbreak during an infectious disease pandemic [35–37]. Even worse, the rapid rise of COVID-19 infections in China after the new policy was announced put a tremendous deal of strain on the country's healthcare system and increased psychological stress on medical workers. The median anxiety score in this study was 7, which was higher than the scores of 6, 6, and 4 in Spain [38], Australia [39], and Korea [40]. The reasons may include the following: Firstly, it had to do with the virus's increased contagiousness following mutations [41] that resulted in a higher number of infections in a short period of time. Secondly, older people were more likely to have severe cases of COVID-19 [42], while the Chinese population is aging rapidly [43]. Thirdly, Chinese people value collectivism and the idea that other people's interests and safety should come first in dangerous circumstances [44]. Lots of nurses worked with illness at the expense of their own and their families' well-being because of the sense of dedication, which would exacerbate their emotions of shame and anxieties for family members [45, 46].

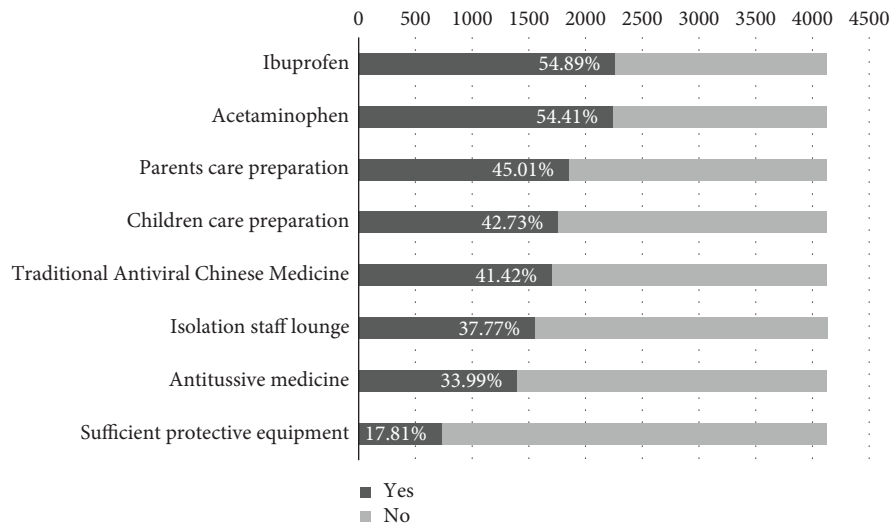


FIGURE 2: Hospital preparation for nurses before the peak infection.

4.2. Factors Associated with Nurses' GAD Grades during COVID-19 Peak Infection Period. The results showed that having a junior professional title, working in a general hospital, living with parents, husband and children, having parents in poor health, having 2 or more children to care for, having a fever over 39°C after infection, and having symptoms of chest pain increased the risk of anxiety among medical staff. Usually, the higher the professional title of the medical staff and the more years they have worked, the better their coping skills and psychological profile, which to some extent reduces the risk of anxiety and depression. This is similar to the findings of previous studies [4], where mid-level technical titles were associated with experiencing severe depression, anxiety, and distress. Furthermore, given the lack of adequate personal protective equipment in most hospitals and the fact that the majority of nurses contract infections while on the job, nurses in administrative or senior roles were less likely to be exposed to confirmed patients and, consequently, experienced less psychological impact.

Interestingly, there were differences in anxiety levels among nurses with different vaccination completion statuses, but vaccination status was not statistically significant in the generalized linear model. However, the chi-square test revealed that vaccine completion status did correlate with nucleic acid test results and symptoms. The vaccination may have prevented infection in some nurses, but this group was so small—only 3.75% of nurses with negative nucleic acid tests, no symptoms, and vaccination completion—that the nurses were unsure they would not contract the infection even after receiving the vaccination, especially given the majority of the population was infected. Secondly, a sizable percentage of nurses (28.56%) exhibited symptoms despite having a negative nucleic acid test result. It could not be ruled out, nevertheless, that some of these nurses experienced symptoms unrelated to infection as a result of intense workloads and excessive psychological stress. However, the

psychological effects of the vaccine were overshadowed by other factors since these nurses believed they were infected.

Our research also revealed a link between anxiety in nurses and COVID-19 infection symptoms as well as family members' health status. Previous research findings have demonstrated that direct contact with COVID-19 patients as frontline healthcare workers was an independent risk factor for all psychology symptoms [4]. It is conceivable that a significant proportion of healthcare workers would additionally unavoidably contract COVID-19 patients after the release of the new policy. As a result, physiological symptoms such as fever, chest tightness, dyspnea, and coughing that occur after infection aggravate nurses' anxiety. In addition, concerns about the health status of elderly parents also became an aggravating factor for the nurses' psychological burden. Because of the disease's dual effects of physical and psychological stress, frontline healthcare workers would be especially vulnerable to symptoms like anxiety, depression, insomnia, and distress, and their mental health required extra attention.

Interestingly, this study found that social support from the hospital affected nurses' anxiety levels, whereas support from family and friends did not. The possible reason for this is related to the collectivist culture mentioned above—nurses may feel guilty about their family and friends—so support from family friends did not reduce their anxiety. Compared to nurses working in general hospitals, nurses employed at specialized and community hospitals reported lower levels of anxiety. This is likely due to the fact that these institutions admitted fewer COVID-19 critically ill patients [47]. In addition, related research has shown that nurses working in COVID-19 facilities were 2.62 times more likely to have higher emotional eating behaviors compared to nurses in non-COVID-19 facilities [48]. This suggested that nurses in COVID-19 facilities may have higher levels of psychological stress and are more deserving of attention.

TABLE 4: Generalized linear model of the factors associated with GAD scores ($n=4128$).

Variable	Beta coefficient	Standard error	95% CI		Wald χ^2	p value
			Lower	Upper		
Age	-0.007	0.0036	-0.014	0.000	3.582	0.058
Gender	0.262 0 ^a	0.1659	-0.063	0.587	2.489	0.115
Level of hospital	-0.212	0.1666	-0.539	0.114	1.626	0.202
	-0.235	0.1543	-0.538	0.067	2.325	0.127
	-0.154	0.1549	-0.457	0.150	0.985	0.321
	0 ^a					
Type of hospital	0.440	0.1099	0.224	0.655	15.994	0.000
	0.142	0.1428	-0.138	0.422	0.988	0.320
	0 ^a					
Professional title	-0.562	0.1190	-0.795	-0.328	22.266	0.000
	-0.060	0.0744	-0.205	0.086	0.642	0.423
	0 ^a					
Marital status	-0.423	0.5862	-1.572	0.725	0.522	0.470
	-0.166	0.5827	-1.309	0.976	0.082	0.775
	-0.169	0.6069	-1.359	1.021	0.078	0.781
	0 ^a					
Education	1.152	0.9308	-0.672	2.977	1.533	0.216
	1.355	0.9285	-0.465	3.174	2.128	0.145
	1.067	0.9398	-0.775	2.909	1.290	0.256
	0.104	0.1073	-0.106	0.315	0.948	0.330
	0 ^a					
Vaccination	-0.402	0.1190	-0.635	-0.169	11.401	0.001
	-0.223	0.1046	-0.428	-0.018	4.552	0.033
	-0.373	0.1373	-0.642	-0.104	7.394	0.007
	-0.227	0.0759	-0.375	-0.078	8.922	0.003
	0 ^a					
Isolation staff lounge preparation	-0.251	0.0650	-0.379	-0.124	14.961	0.000
	0 ^a					
Traditional antiviral Chinese medicine preparation	0.125	0.0672	-0.007	0.257	3.459	0.063
	0 ^a					
Ibuprofen preparation	0.255	0.0665	0.124	0.385	14.649	0.000
	0 ^a					
Antitussive medicine preparation	0.062	0.0721	-0.079	0.204	0.748	0.387
	0 ^a					
Acetaminophen preparation	0.010	0.0641	-0.116	0.136	0.025	0.875
	0 ^a					

TABLE 4: Continued.

Variable	Beta coefficient	Standard error	95% CI		Wald χ^2	p value
			Lower	Upper		
Health status of parents	Healthy	-0.593	-0.732	-0.455	70.549	0.000
	One unhealthy	-0.267	-0.428	-0.106	10.532	0.001
	Both unhealthy	0 ^a				
Fever (over 39°C)	No	-0.238	-0.403	-0.072	7.947	0.005
	Yes	0 ^a				
Headache	No	-0.162	-0.354	0.030	2.727	0.099
	Yes	0 ^a				
Chest distress	No	-0.454	-0.676	-0.232	16.116	0.000
	Yes	0 ^a				
Dyspnea	No	-0.442	-0.658	-0.226	16.053	0.000
	Yes	0 ^a				
Cough	No	0.172	0.008	0.336	4.225	0.040
	Yes	0 ^a				
Fatigue	No	0.122	-0.070	0.314	1.546	0.214
	Yes	0 ^a				
Insufficient protective equipment	No	-0.295	-0.458	-0.132	12.579	0.000
	Yes	0 ^a				
Number of children	0.111	0.0539	0.006	0.217	4.262	0.039
PSSS family	-0.013	0.0094	-0.031	0.006	1.758	0.185
PSSS friend	-0.006	0.0112	-0.028	0.016	0.286	0.593
PSSS others	-0.067	0.0102	-0.087	-0.047	43.268	0.000

Dependent variable: GAD grade, none = 0, mild = 1, moderate = 2, severe anxiety = 3. ^aReference. [†]Unclassified hospital: some small hospitals such as community health centers. ^{*}Type of family structure: small family: couple and children living together. Three-generation family: couple, children, and grandparents living together.

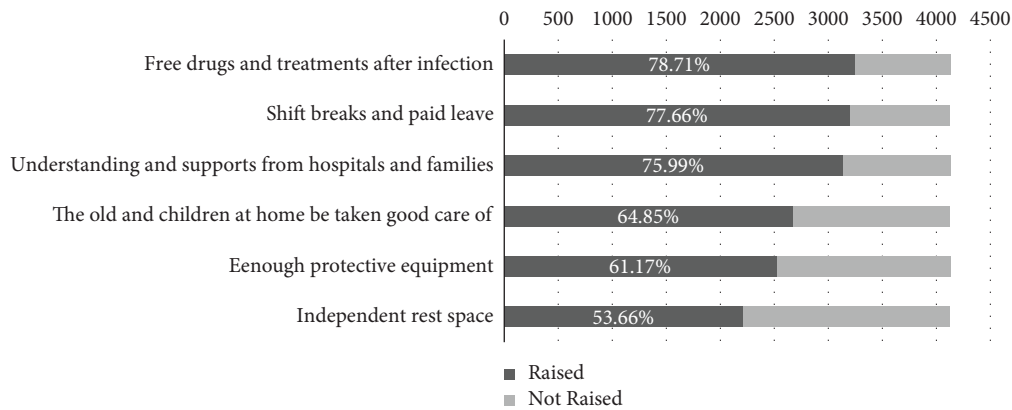


FIGURE 3: The major needs of nurses during COVID-19 peak infection period.

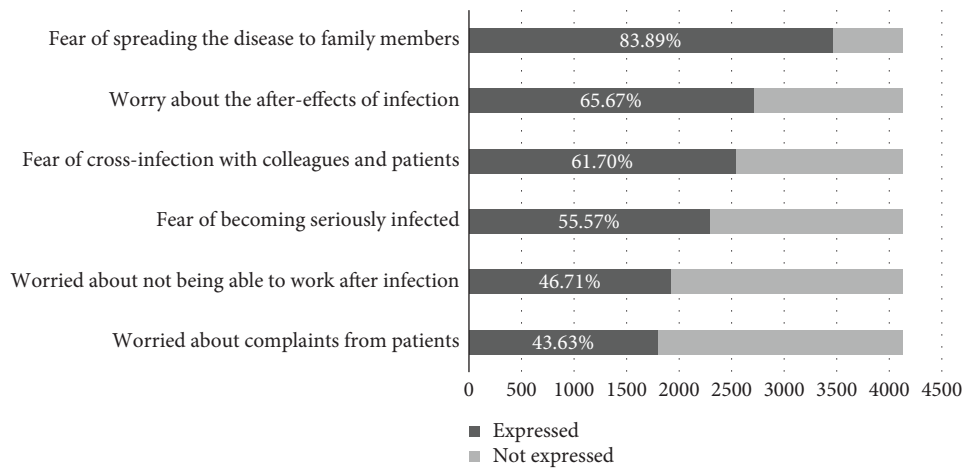


FIGURE 4: The major concerns of nurses during COVID-19 peak infection period.

4.3. Worries about Family Members Became the Main Concerns of the Nurses. The results of the two open-ended questions on nurses' needs and concerns showed that worries about family members had become the nurses' main concern. 83.89% of the nurses expressed the fear of spreading diseases to their family members, while 64.85% of the nurses expressed the needs to take care of old people or children at home, which was consistent with the findings of Nashwan et al. [49]. Firstly, it has to do with the predominant family structure of small family and three-generation family in China [50]. The study's general data also revealed that the two types of families—small families, which consist of couples and children, and three-generation families, which consist of parents, couples, and children—accounted for the majority of the components, which were 33.19% and 28.08%, respectively. In the two types of families, nurses were expected to take on the role of primary caregiver for family members, with a focus on the elderly and children. Secondly, nurses may infect their families with the virus when they return home from work. That is why 53% of nurses cited the need for separate rest spaces—they did not want to spread the virus to their families. Therefore, managers can appropriately protect and comfort the family

members of medical staff when making plans for the prevention and control of infectious diseases, which will lessen the stress of frontline medical professionals.

4.4. Overloaded Work Schedules and Lack of Rest Became a Common Situation. The findings showed that 76.31% of the participants had a fever of 39°C or above. Nurses with more severe symptoms really had to take time off from work, while nurses with less severe symptoms had to stay on the job and often even put in extra hours to make up for the personnel deficit caused by infection [51]. Therefore, in this study, many nurses raised the need for rest or paid leave. It was surprising to learn that 43.63% of the participants were worried about patient complaints. Studies do, in fact, indicate a link between higher complaint rates and a lack of human resources [52]. However, the majority of nurses were completing their work in a state of illness. Therefore, the media should publicize this more so that the public understands the working conditions of nurses and the high stress situations in which they work. Managers should provide more social support—it was also confirmed in this study that support from organizations (PSSS others) could significantly reduce nurses' anxiety state.

5. Limitations

The study had a few limitations. Firstly, asking nurses to fill out the questionnaire at a time when they were busy and under high stress may yield untrue results and add to their burden; secondly, as this study investigated the psychological state of nurses in the acute phase, depression was not discussed in depth—since the nurses were in a state of stress and showed more courage, while depressive states might continue to rise long after the stressful event is over [53], according to Selye's [54, 55] three-stage general adaptation syndrome (alarm, resistance, and exhaustion). Consequently, it is important to follow the psychological well-being of nurses and to implement interventions following the epidemic's peak; thirdly, this study was conducted in one province in China, which may have resulted in sampling bias due to differences between provinces or regions; fourthly, as had mentioned before, the study was conducted over a short period of time and lacked longitudinal follow-up. Due to the increasing severity of the situation, the mental health symptoms of healthcare workers may become more severe. Therefore, the long-term psychological impact of this population warrants further research.

6. Conclusions

This study investigated the psychological state of nurses at the peak of the COVID-19 outbreak in China after the abandonment of the “dynamic zero COVID-19 strategy.” Nurses' anxiety was more severe, with hospital type, family structure, protective preparation, medication preparation, symptoms, parental state of health, number of children, and social support being the main influencing factors. Most of nurses were infected during that period. Overloaded work schedules and lack of rest became a common situation. Worries about family members became the main concerns of the nurses.

7. Relevance to Clinical Practice and Education

In times of large-scale epidemics of infectious diseases, medical human resources are in short supply and medical staff are under greater stress. Managers should make contingency plans and consider the care and protection of medical staff's family members. The media should explain the operation and work of hospitals in extraordinary times so that the public understands the state of frontline epidemic fighters.

Data Availability

Data that support the findings of this study are available upon reasonable request. If necessary, please contact email 382731326@qq.com.

Additional Points

What Is Already Known. (i) Frontline nurses experienced significant psychological stress during the COVID-19 epidemic. (ii) After the Chinese government dropped its

“dynamic zero strategy,” a large number of people were infected, creating a peak period of the epidemic. (iii) Overloaded work schedules and insufficient sleep became a common situation during COVID-19 peak infection period. *What This Paper Adds.* (i) Nurses' anxiety levels were even worse during the peak of the epidemic. (ii) Worries about family members became the main concern of the nurses. (iii) Nurses were worried about complaints and expected understanding from the public during the peak of the epidemic.

Ethical Approval

The study was approved by the Ethics Committee of the First People's Hospital of Changde (No.2023-005-01).

Disclosure

The authors declare that this financial support did not influence the study design, data collection, analysis, interpretation of data, writing of the report, or the decision to submit the article for publication. There were no conditions attached to the funding, and the funding agency had no role in the research beyond the financial support provided. Thus, the authors maintain full scientific independence and integrity in the conduct of this research.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Liuyi Zhang developed methodology, contributed software, and performed formal analysis; wrote the original draft; and performed project administration. Kemei Zhang investigated the study, collected resources, and curated the data. Li Tong investigated the study and curated the data. Yafen Guo and Jinhua Shen investigated the study and visualized the study. Xue-qing Zhang conceptualized the study and validated the study, reviewed and edited the study, and supervised the study. Pan Yang investigated the study and performed formal analysis.

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Research Article

Appreciative Leadership, Workplace Belongingness, and Affective Commitment of Nurses: The Mediating Role of Job Crafting

Manal Saleh Moustafa Saleh ^{1,2} Zaineb Naiem Abd-Elhamid,² Nouf Afit Aldhafeeri ^{3,4,5}
Hamad Ghaleb Dailah ⁶ Atallah Alenezi ¹ Mohamed Zoromba ^{7,8}
and Hanan Elsaid Elsabahy⁸

¹College of Applied Medical Science, Shaqra University, Shaqra, Saudi Arabia

²Faculty of Nursing, Zagazig University, Zagazig, Egypt

³College of Nursing, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia

⁴King Abdullah International Medical Research Center, Riyadh, Saudi Arabia

⁵Ministry of the National Guard-Health Affairs, Riyadh, Saudi Arabia

⁶College of Nursing, Jazan University, Jazan, Saudi Arabia

⁷College of Nursing, Prince Sattam Bin Abdulaziz University, Al Kharj, Saudi Arabia

⁸Faculty of Nursing, Mansoura University, Mansoura, Egypt

Correspondence should be addressed to Manal Saleh Moustafa Saleh; ms_salh@zu.edu.eg

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Aim. This study aimed to investigate the appreciation leadership, workplace belongingness, and affective commitment among nurses, with a specific focus on the mediating role of job crafting. **Background.** Leadership, particularly in healthcare care, significantly influences employee experiences and outcomes. Appreciative leadership fosters a positive work environment, valuing and motivating employees. However, its impact on workplace belongingness and affective commitment among nurses requires further exploration. Job crafting, a mechanism in which employees shape their roles to align with their preferences, strengths, and values, can serve as a mediator in the relationship between appreciative leadership and outcomes, such as workplace belongingness and affective commitment. **Subjects and Methods.** A cross-sectional descriptive study was conducted in nurses from two hospitals (Prince Mohammed bin Abdulaziz and Shaqra General Hospital) in Riyadh City, Saudi Arabia. Four standardized scales were used to assess appreciation for leadership, sense of belonging, affective commitment among nurses, and job crafting; 381 nurses were surveyed. AMOS structural equation modeling (SEM) was used to examine the hypothetical model of the study. **Results.** APL significantly affects job-crafting behaviors, belonging, and affective commitment among nurses. Furthermore, job-crafting behaviors significantly affect belonging among nurses and commitment. **Conclusions.** This indicates that when nurses perceive their leadership positively, their job-crafting behaviors increase, which in turn enhances their sense of belonging at work. Furthermore, these findings indicate that positive leadership perceptions directly improve nurses' commitment to their jobs. This study recommended that educational programs can upgrade leadership styles and change practice levels. **Implications for Nursing Management.** Nursing managers should focus on cultivating appreciative leadership behaviors, such as providing regular feedback, recognizing achievements, and fostering a supportive work culture. Organizations can encourage the creation of jobs among nurses by offering opportunities for autonomy, skill development, and flexibility in job roles.

1. Introduction

In contemporary organizational settings, the role of leadership in shaping employee experiences and outcomes has received

significant attention. Leadership becomes critical in healthcare settings, as nurse performance and well-being directly affect patient care. Appreciative leadership stands out among leadership philosophies in that it places a strong focus on

identifying and developing the potential and strengths of individuals to create a positive work environment [1, 2].

Appreciative leadership is characterized by its focus on strengths, opportunities, aspirations, and results (SOAR). Encourage leaders to cultivate a culture of appreciation, where employees feel valued, empowered, and motivated to contribute their best efforts [3]. Although the potential benefits of this leadership style have generally been acknowledged, more research is needed to fully understand how it can improve nurses' sense of affective commitment and belonging in the workplace [3, 4].

Workplace belonging refers to the sense of connection, acceptance, and inclusion that individuals experience within their work environment [5]. Affective commitment, on the other hand, reflects an employee's emotional attachment and identification with their organization, leading to greater loyalty and engagement. Both factors are crucial to promote a positive organizational environment and facilitate employee well-being and performance [6].

In addition, the concept of job crafting has emerged as a mechanism through which employees actively shape their roles and experiences to align with their preferences, strengths, and values. Job crafting involves proactive modification of job tasks, relationships, and perceptions to improve motivation, satisfaction, and performance [7]. Given its relevance to employee autonomy and engagement, the design of the job can serve as a key mediator in the relationship between appreciated leadership and outcomes such as belonging to the workplace and affective commitment [8].

This study aims to investigate the appreciative leadership, workplace belongingness, and affective commitment among nurses, specifically focusing on the mediating role of job crafting. By examining these relationships, insights can be gained into the mechanisms through which appreciative leadership influences nurse outcomes, thereby informing leadership practices and organizational interventions aimed at improving employee well-being and performance in healthcare settings.

In general, this research seeks to contribute to theoretical understanding and practical implications on the impact of leadership on employee experiences and results, with implications for fostering a supportive and engaging work environment in the nursing profession.

1.1. Theory and Hypotheses

1.1.1. Appreciative Leadership. The nursing field has faced previously unheard-of difficulties recently, which has highlighted the vital role that capable leadership plays. The pandemic's increased mental and physical demands on nurses resulted in considerable stress and burnout, which raised turnover rates in healthcare settings globally. These findings underline the necessity of leadership strategies that not only meet urgent clinical needs but also cultivate a positive and encouraging work atmosphere [9]. With its focus on identifying and fostering each nurse's unique talents and potential, appreciative leadership stands out as a particularly pertinent strategy. Appreciative leadership can

mitigate burnout and strengthen nurses' emotional ties to their organizations by emphasizing positive reinforcement, personal development, and the value of each team member's efforts. This could potentially stabilize workforce dynamics in these challenging times [10].

The benefits of grateful leadership have been highlighted in recent research, especially in the healthcare industry. Research has continuously shown a substantial correlation between improved job satisfaction and decreased workplace stress and appreciative leadership methods, which emphasize employee strengths acknowledgment and empowerment. For example, Janet (2017) observed that patient care outcomes and nurse retention were significantly improved in hospital settings when appreciative leadership was implemented [11]. In a similar vein, the authors in [12] found that healthcare personnel who used appreciative leadership demonstrated higher levels of creativity and cooperation. These results highlight how grateful leadership can improve operational efficiency and create a favorable organizational climate in healthcare settings.

Notwithstanding these encouraging signs, there are still large gaps in our knowledge of the precise ways in which appreciating leadership affects important psychological outcomes like affective commitment and workplace belongingness in nurses. The majority of previous research has concentrated on work satisfaction and retention in general, paying less attention to the more profound emotional and psychological processes that mediate these associations [13]. Moreover, not enough attention has been paid to the function of job crafting as a potential mediator in the dynamics between appreciating leadership and nursing outcomes. This vacuum in the literature points to the urgent need for targeted studies that explore these connections while also elucidating the mechanisms by which appreciating leadership can bring about change in the nursing setting [14, 15]. By addressing these gaps, our study aims to provide a more comprehensive understanding of how appreciative leadership can be strategically applied to improve both the well-being of nurses and the overall quality of healthcare delivery.

1.1.2. Workplace Belongingness. Workplace belongingness, the sense of acceptance and inclusion within an organization, is crucial for employee well-being, performance, and job satisfaction among healthcare professionals, particularly nurses [16] argue that a sense of belonging is derived from interpersonal interactions between employees at work, which is necessary for a relational value to be a part of that system. Another way to describe belongingness to the workplace is the extent to which a person feels personally acknowledged, respected, included, and supported by others at work. The idea of belonging holds that when one feels that justice has been done, one feels extremely intimate and connected to the other members of the group. According to [17], concerns about justice support moral and logical reasons that result from three fundamental needs: a need for control, a need for purpose in life, and a desire for a sense of belonging.

1.1.3. Affective Commitment. An emotional bond with the organization defines the affective commitment feature of organizational commitment. According to this hypothesis, which has its roots in organizational behavior research, nurses who have a strong emotional bond with their organization are more likely to demonstrate traits like loyalty, initiative, and corporate citizenship. Affective commitment is impacted by things like job happiness, leadership efficacy, and perceived organizational support [18]. An employee's affective commitment is his or her emotional attachment to the organization for which he or she works. Strong affective commitment among staff members makes them more dedicated, engaged, and motivated to achieve organizational goals. Organizational management methods often have a direct impact on this kind of dedication [19].

Sometimes affective commitment is referred to as an affective attachment to an organization characterized by shared values, a desire to remain in the organization, and a willingness to exert effort on its behalf [20]. Workers with affective attachment tendencies are more likely to have a sense of identification and belonging, which increases their involvement with work, motivation to work toward the organization's objectives, and desire to stay with the organization. For this reason, the affective dimension appears to be significant. As a result, the authors in [21] saw commitment as a discriminant between dedication and loyalty. Affective commitment is recognized as a more powerful and reliable measure of organizational commitment than normative or continuous commitment.

1.1.4. Job Crafting. Nurses' work is frequently subjected to psychological stress; therefore, it is essential to create a welcoming work environment and implement administrative regulations that improve nurses' combination with their workplace and promote job crafting [22]. The proactive practice of "job crafting" describes how nurses modify job standards and resources to better suit their skill sets and preferences. The job-creation model identifies three dimensions: growing or focusing on social networks that boost structural resources, lowering onerous job demands, and raising demanding job expectations. Nurses manage their careers by modifying the level of demands and resources associated with their jobs [23]. In the same way, job crafting is divided into three subfactors: task crafting, which involves changing job tasks; relational crafting, which involves changing the dynamics of interactions at work; and cognitive crafting, which involves changing how employees view the importance and meaning of their jobs [24].

H1: Appreciative leadership positively influences the sense of belonging of nurses.

Fostering a sense of belonging requires a team to have trust and more social exchanges, which are both improved by appreciative leadership. Leaders who emphasize talents and contributions make nurses feel more important and a part of the team [25]. Research

has indicated that emphasizing positive feedback and recognition in leadership greatly enhances staff members' sense of community and belonging [26].

H2: Appreciative leadership positively influences affective commitment among nurses.

Commitment theory states that employees' emotional attachment to the organization is strengthened by leadership that shares their beliefs and aspirations, which results in increased affective commitment. Developing strategies and systems that involve and uphold seasoned employees, honor their commitments, and lessen their desire to depart the organization requires strong leadership [27]. Nursing faces burnout due to demanding work, staffing shortages, and hierarchical structures. Appreciative leadership, a relationship-based style, promotes empowerment, encouragement, and positive reinforcement, improving nurses' engagement, work happiness, and commitment to the organization [28, 29].

H3: Job crafting positively influences nurses' sense of belonging.

Job crafting allows individuals to reshape their work environment and interactions, thereby enhancing their fit within the organization and increasing their sense of belonging [30]. Research demonstrated that job-crafting activities, particularly those modifying social aspects of work, significantly boost employees' sense of belonging [31].

H4: Job crafting positively influences affective commitment among nurses.

Employee loyalty to the organization increases when they can better connect their work with their personal beliefs and interests through job crafting, which makes their work more fulfilling and meaningful. According to a study, when workers participate in job crafting, their affective commitment rises as a result of better job satisfaction and a stronger alignment with the organization's aims [32].

H5: Job crafting mediates the relationship between appreciative leadership and belonging among nurses.

By allowing nurses to customize their responsibilities, appreciative leadership may promote job crafting. This increases nurses' sense of belonging as they feel more important and incorporated into the team [30].

H6: Job-crafting behaviors mediate the relationship between appreciated leadership and affective commitment among nurses, with a significant indirect effect.

The job-crafting behaviors of nurses are probably improved by appreciative leadership, and this has a favorable impact on their affective commitment. This process takes place when nurses experience increased emotional attachment to the company as a result of feeling competent in their tasks and being encouraged by their management [33].

According to a study, work crafting has a crucial mediating function in the relationship between affective commitment and leadership styles, hence bolstering the indirect impact of job crafting on leadership [34].

Taking into account the seven hypotheses mentioned above, the conceptual research model is presented as follows (Figure 1).

1.2. The Study Objective. This study aims to investigate the consequences of appreciative leadership on workplace belongingness and affective commitment among nurses, specifically focusing on the mediating role of job crafting.

2. Methodology

2.1. Study Design. A cross-sectional descriptive study was selected.

2.2. Study Setting. The study was carried out in two hospitals (Prince Mohammed bin Abdulaziz and Shaqra General Hospital) in Riyadh City, Saudi Arabia.

2.3. Participants. Because this study is descriptive and the primary outcome is a continuous variable, the sample of nurses was estimated from the addition of the hospital mentioned above, an open-source sample size calculator was used to determine the required sample size by determining the total population size of the previous two hospitals (Prince Mohammed bin Abdulaziz and Shaqra General Hospital). When a population-level outcome factor (p) = 50% \pm 5 was hypothesized, and 2000 nurses were studied with confidence limits as % of 100 (absolute \pm %) (d) = 5%, design effect (for cluster surveys—DEFF) = 1, confidence level = 95%, and sample size $n = [DEFF * Np(1 - p)] / [* (N - 1) + p * (1 - p)] / [(d^2/Z^2 - \alpha/2 * (N - 1))]$, and 377 was the minimum sample size needed. An additional 30% of nurses needed to compensate for an estimated dropout rate or uncompleted response [35]. The final sample size was 491, and the final sample size recruited for analysis was 381, with a response rate of 77.6%.

A two-phase sampling approach was adopted to enroll nurses as follows:

Phase 1: Using stratified sampling, the number of participating nurses in each hospital was determined.

Phase 2: In each hospital, nurses were recruited using convenience sampling. Nurses of licensed staff, those who worked during the study period, and those with at least six months of experience in their present hospital were included. Of the 400 questionnaires distributed, 390 were returned and 9 were invalid. As a result, the final sample size was 381, resulting in a 97.6% effective rate.

2.4. Instruments Used in the Study. Data for this study were collected using four standardized scales that were originally developed and used in English.

2.4.1. Appreciative Leadership Scale (ALS). Appreciative leadership was measured with an 18-item scale developed by [36]. It had been used to find out how nurses felt about their nurse leader's appreciation. There are six elements on this scale for each of the three dimensions listed below: inclusive inquiry, inspiring illumination, and integrity. The internal consistency reliabilities for each subscale according to the early subscale were 0.889, 0.850, and 0.899. A five-point Likert scale was used to rate each item on the scale (1 = all not so to 5 = very different from), where a higher score indicated a higher level of nurses' perception of their nurse leader's appreciation.

2.4.2. Job Craft Questionnaire (JCQ). Reference [37] created the JCQ to assess the particular types of activities that represented the craft of the job among nurses, which was evaluated using a 15-item scale comprising five items for each of the three dimensions: task creation, cognitive creation, and relational creation. Participants indicate the frequency with which they have participated in each job-crafting activity from 1 (hardly ever) to 6 (very often). According to Slemple and Vella-Brodrick, the reliability scores for task, relational, cognitive, and overall job crafting were, in order, 0.87, 0.89, 0.83, and 0.91.

2.4.3. Workplace Belongingness Scale (WBS). The belongingness of the workplace among nurses to their job and organization was measured using the 12-item scale developed by [38]. All elements of the instrument were positively formulated, and the nurses' responses were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), where higher scores represent a greater degree of belonging in the workplace.

2.4.4. Affective Organizational Commitment Scale (AOCS). Reference [39] created this six-item measure to assess nurses' affective organizational commitment levels. Higher scores indicate a higher level of affective organizational commitment among nurses. The nurses' responses were scored on a five-point Likert scale, with 5 representing strong agreement and 1 representing strong disagreement.

2.4.5. Demographic Information of Study Participants. The demographic information of the participants was collected, including their age, sex, education, marital status, years of nursing experience, current unit, and hospital.

2.5. Pilot Study. A preliminary investigation was carried out to assess the clarity of the questionnaires and the time required for their completion. Additionally, a preliminary mean of the outcome variables was calculated to estimate the necessary sample size. The 38 nurses who were selected from participating hospitals for the pilot study were later not included in the final study sample. The questionnaire took 20 to 25 minutes to complete, and the pilot nurses attested to its clarity and understandability. In terms of internal consistency, Cronbach's alpha coefficients were 0.86 for the total

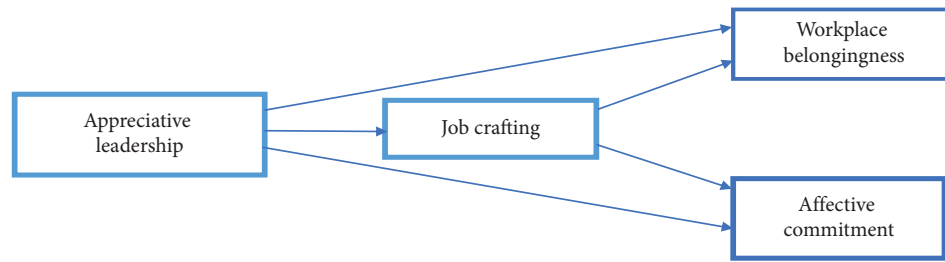


FIGURE 1: Conceptual model.

appreciation scale for leadership, 0.95 for the total scale for job creation, 0.89 for belonging to the workplace, and 0.90 for the scale of affective organizational commitment, indicating high and acceptable reliability.

2.6. Data Collection. Data collection for this study was conducted from February to May 2023, utilizing self-reported assessments from staff nurses. Prior to the commencement of data collection, the necessary ethical approvals were secured. The primary investigator initially met with the chief nurses of each hospital unit to explain the study's objectives and to seek their support in facilitating the data collection process. To enhance the perceived anonymity and reduce potential response bias, nurses meeting the inclusion criteria were provided with sealed envelopes containing the survey questionnaires. These envelopes were distributed in their work areas during their shifts. The cover letter of the questionnaire clearly stated the study's purpose, reassured the participants of the anonymity and voluntary nature of their responses, and instructed them to reflect on their experiences with a specific nurse manager. To further ensure confidentiality and reduce any pressure, nurses were asked to return their completed questionnaires in the sealed envelopes to a designated drop box located in a common area within each unit by a specified deadline. Participation was implied through the voluntary completion and submission of the surveys. This method aimed to minimize any direct interaction with the research team during the submission process, thereby fostering a more confidential and unbiased environment for providing genuine responses.

2.7. Ethical Considerations and Consent to Contribute. The Faculty of Nursing Ethics Committee approved ethical approval (No. 21-2-2023). Potential ethical concerns such as participant well-being, privacy, and anonymity were upheld throughout the research procedure. Participants were informed of all study-related materials and their ability to withdraw at any point while the study was in progress. Furthermore, only the authors had access to the sensitive participant data, which was held in a locked, secured cabinet. Lastly, everyone had the guts to raise any pertinent queries.

2.8. Statistical Design. AMOS 25 and IBM SPSS 27 were used for data analysis. The study variables and the nursing characteristics were presented using descriptive statistics. Variations in job development, workplace belonging,

affective commitment, and appreciation of leadership were examined about sample characteristics using independent *t*-tests and analysis of variance (ANOVA). Pearson's correlation was used to examine the bivariate correlations between the research variables and related subdomains. The proposed model was investigated using AMOS structural equation modeling (SEM). The validity and reliability of the study constructs were evaluated. *p* values with two tails less than 0.05 denote statistical significance.

3. Results of the Study

Table 1 shows demographic data samples and differences in study variables. The participants were predominantly between 30 and 35 years of age (39.1%). Most of them (60.6%) were women. Most of them were single (53.3%), 82.7% had a Bachelor's degree in Nursing, and 45.9% had <3 years of experience.

Table 2 analyzes the correlation coefficients among the variables studied, and several significant relationships emerged. In particular, cognitive crafting demonstrated strong positive correlations with relational crafting ($r = 0.674^{**}$), total job crafting ($r = 0.902^{**}$), and workplace belonging ($r = 0.612^{**}$).

Furthermore, affective commitment exhibited a robust positive correlation with workplace belonging ($r = 0.821^{**}$) and a notable association with total job creation ($r = 0.690^{**}$). This implies that staff nurses who feel a sense of belonging in their workplace are more likely to be affective, committed to their roles, and involved in crafting their jobs.

The belonging of the workplace demonstrated a remarkably high positive correlation with the integrity subscale of appreciation of leadership ($r = 0.654^{**}$), suggesting that people who feel like they belong to the workplace are more likely to exhibit integrity in their actions.

Furthermore, inspiring illumination and integrity showed a substantial positive correlation ($r = 0.509^{**}$). This may imply that nurses who perceive their leaders as inspiring and illuminating also tend to perceive them as having high levels of integrity.

Table 3 shows the effect of mediation of the appreciation of staff nurses for the leadership between workplace belongingness, affective commitment, and job design, and Figure 2 shows that appreciative leadership significantly affects job-crafting behaviors ($\beta = 0.45$, $p < 0.001$), workplace belonging ($\beta = 0.66$, $p < 0.001$) and affective commitment among staff nurses ($\beta = 0.78$, $p < 0.001$). Furthermore, job-crafting behaviors significantly affected

TABLE 1: Participants' demographics and differences in study variables (N = 381).

Characteristic	Category	No. (%)	Job crafting		Workplace belonging		Commitment		Appreciative leadership	
			M (SD)	t/F (P)	M (SD)	t/F (P)	M (SD)	t/F (P)	M (SD)	t/F (P)
Age (years)	20: <25	122 (32)	3.36 (0.97)		3.38 (0.78)		3.32 (0.81)		2.67 (0.36)	
	25: <30	110 (28.9)	3.30 (0.85)	0.153 (0.858)	3.31 (0.52)	1.45 (0.236)	3.41 (0.65)	2.05 (0.131)	2.53 (0.35)	4.94 (0.008)
	30: <35	149 (39.1)	3.35 (0.95)		3.45 (0.60)		3.50 (0.71)		2.59 (0.32)	
Gender	Male	150 (39.4)	3.29 (0.87)	0.895 (0.371)	3.27 (0.63)	2.865 (0.004)	3.31 (0.70)	2.46 (0.014)	2.57 (0.32)	1.32 (0.189)
	Female	231 (60.6)	3.37 (0.96)		3.46 (0.64)		3.49 (0.74)		2.62 (0.36)	
Marital status	Single	204 (53.3)	3.23 (0.89)	2.37 (0.018)	3.32 (0.66)	2.177 (0.030)	3.28 (0.82)	4.00 (<0.001)	2.59 (0.38)	0.456 (0.643)
	Married	175 (45.9)	3.45 (0.95)		3.46 (0.62)		3.58 (0.57)		2.61 (0.30)	
Education	BSD	315 (82.7)	3.27 (0.87)		3.35 (0.64)		3.40 (0.71)		2.60 (0.35)	
	Master	33 (8.7)	2.88 (0.86)	30.7 (<0.001)	3.18 (0.60)	15.08 (<0.001)	2.97 (0.83)	19.72 (<0.001)	2.54 (0.38)	0.55 (0.577)
	Technical	33 (8.7)	4.40 (0.76)		3.93 (0.35)		4.03 (0.23)		2.60 (0.29)	
Years in nursing	<3 years	175 (45.9)	3.38 (0.96)		3.48 (0.620)		3.53 (0.70)		2.61 (0.15)	
	3: 6 years	162 (42.5)	3.14 (0.83)	13.56 (<0.001)	3.20 (0.59)	15.19 (<0.001)	3.22 (0.73)	11.77 (<0.001)	2.58 (0.41)	0.237 (0.789)
	>6 years	44 (11.5)	3.92 (0.86)		3.69 (0.72)		3.69 (0.62)		2.61 (0.15)	
Job description	Yes	263 (69)	3.40 (0.89)	1.83 (0.065)	3.54 (0.55)	7.05 (<0.001)	3.60 (0.65)	7.65 (<0.001)	2.64 (0.37)	3.41 (0.001)
	No	118 (31)	3.20 (0.99)		3.04 (0.69)		3.01 (0.73)		2.51 (0.25)	

A Bachelor of Science Degree (BSD). (M) mean. (SD) Standard deviation. (F) One-way analysis of variance. (t) t test for the independent group. (P) significance level.

TABLE 2: Analyzing the correlation coefficients among the studied variables (N = 381).

Studied variables	Mean (SD)	Cognitive crafting	Relationship crafting	Total job crafting	Workplace belonging	Commitment	Inspiring illumination	Integrity	Inclusive inquiry	Total appreciative leadership
Task crafting	R 3.28 (1.02)	0.848**	0.749**	0.948**	0.555**	0.603**	0.221**	-0.076	0.228**	0.178**
Cognitive crafting	R 3.44 (1.04)	1	0.674**	0.902**	0.612**	0.625**	0.279**	-0.120*	0.157**	0.160**
Relationship crafting	R 3.33 (0.99)		1	0.894**	0.727**	0.678**	0.303**	-0.009	0.328**	0.287**
Total job crafting	R 3.34 (0.93)			1	0.690**	0.694**	0.290**	-0.069	0.267**	0.232**
Workplace belonging	R 3.39 (0.64)				1	0.821**	0.394**	0.025	0.336**	0.349**
Commitment	R 3.42 (0.73)					1	0.487**	0.095	0.378**	0.440**
Inspiring illumination	R 2.61 (0.45)						1	0.286**	0.509**	0.826**
Integrity	R 2.53 (0.48)							1	0.301**	0.654**
Inclusive inquiry	R 2.63 (0.44)								1	0.793**
Total appreciative leadership	R 2.60 (0.35)									1

r = Pearson correlation. * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). α = Cronbach's alpha.

TABLE 3: Mediation effect of staff nurses' appreciative leadership among workplace belongingness, affective commitment, and job crafting (N = 381).

Indirect effect	β	p	BC 95% CI Lower/upper
Appreciative leadership on workplace belonging	0.19	0.001	0.15/0.27
Appreciative leadership on affective commitment	0.18	0.002	0.13/0.24

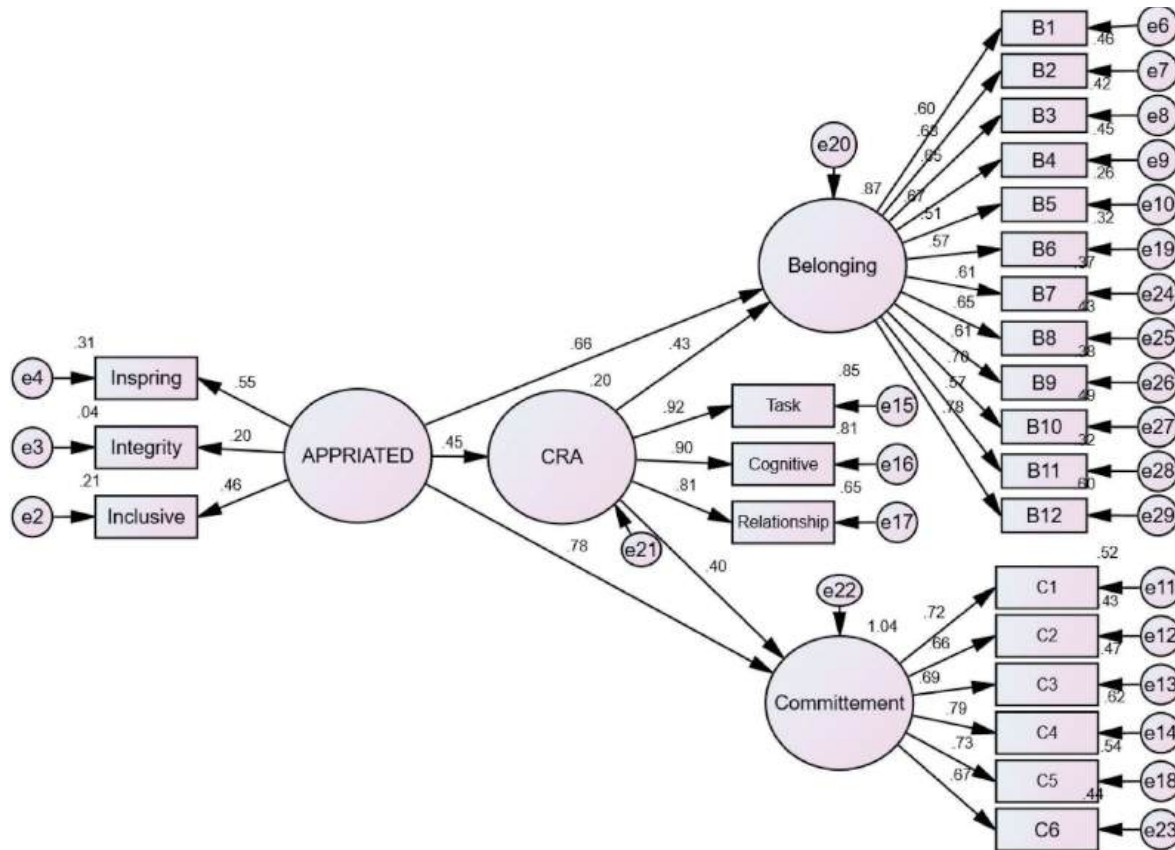


FIGURE 2: Mediation effect of staff nurses' appreciative leadership among workplace belongingness, affective commitment of staff nurses, and job crafting (N = 381).

belonging among nurses ($\beta = 0.43$, $p < 0.001$) and affective commitment ($\beta = 0.40$, $p < 0.001$). The indirect effect of job-design behaviors on the relationship between appreciative leadership and belonging to the workplace was significant ($\beta = 0.19$, $p = 0.001$, 95% CI 0.15/0.27). The indirect effect of job-design behaviors on the relationship between appreciated leadership and affective commitment was significant ($\beta = 0.18$, $p = 0.002$, 95% CI: 0.13/0.24), indicating that job construction behaviors among staff nurses mediated relationships between appreciated leadership, belonging to the workplace, and affective commitment among staff nurses.

4. Discussion

To improve nurse well-being and retention, it is critical to comprehend how appreciative leadership, affective commitment, workplace belongingness, and job crafting interact. This knowledge will help build focused treatments and organizational policies [40]. Thus, the purpose of this

study is to investigate how job crafting functions as a mediator in the relationship among nurses between appreciative leadership, workplace belongingness, and affective commitment. Organizations can create conditions that support the growth of their nursing staff by clarifying these routes, which will eventually improve patient outcomes and organizational success. Results showed that appreciative leadership has a strong and significant direct effect on workplace belongingness. This finding is valuable because it indicates that nurses' perceptions of their leadership directly contribute to their sense of belonging at work. These results are in line with [41] earlier studies, showing that the direct effect of appreciative leadership on workplace belongingness is significant. Also, the authors in [30] agreed with these findings and reported that appreciative leadership has a positive effect on workplace belongingness. In addition, the findings of the study showed that the effect of appreciative leadership on workplace belongingness is significant [29].

The results of the present study reported that appreciative leadership also has a robust direct effect on affective commitment, indicating that positive leadership perceptions directly enhance nurses' affective commitment to their jobs. These results were supported by [41], who showed that the direct effect of appreciative leadership on affective commitment is significant. Also, the authors in [33] revealed that there is a noteworthy direct correlation between appreciating leadership and affective commitment. Furthermore, according to [42], commitment and appreciative leadership have a favorable relationship with the intentions to turnover. These results are in line with those of [43], who reported that appreciated leadership has a major influence on employee satisfaction and that the relationship between appreciated leadership and affective commitment is accepted.

Related to job-crafting behaviors' effects, the current study showed that job-crafting behaviors have a significant positive effect on workplace belonging, highlighting the importance of these behaviors in fostering a sense of belonging among nurses. These results are consistent with those of [44], who found that job crafting significantly and favorably affects faculty members' sense of belonging at work. Furthermore, this result is in line with a study [41], which discovered a favorable correlation between job crafting and a sense of belonging at work. However, these results are contradictory with [29], who reported that job crafting has an insignificant effect on workplace belongingness.

Furthermore, job-crafting behaviors also positively affect commitment, further establishing the role of job crafting in enhancing organizational commitment. This leads to the same conclusion as [35] who found that highly bonded employees can reduce the severity of stressors and initiate proactive job crafting. He came to the conclusion that job crafting, which raises employee performance, requires a high level of commitment. Also, the authors in [45] it was observed that as organizational commitment rises, job performance increases. When job crafting is added to this relationship, the effect is even higher. This finding is consistent with that of [46], who found a negative relationship between turnover intention and organizational commitment. These results suggest that allowing workers to engage in job-crafting behavior may lessen the intention of turnover, which will eventually increase employee engagement and satisfaction. Furthermore, [47, 48] results showed a moderated effect of affective commitment on the job crafting and concluded that those employees with high levels of need commitment independent of their job crafting.

Finally, appreciative leadership significantly affects job-crafting behaviors, workplace belonging, and affective commitment among nurses. This results congruence with [33], who indicated that the results demonstrate that affective commitment and workplace belongingness are positively impacted by appreciative leadership. Job crafting, however, has a favorable impact on affective commitment but a negligible influence on workplace belongingness. The relationship among job crafting, workplace belongingness, and appreciative leadership is significantly mediated by affective commitment. Also, this result agrees with [41]. The results of this study demonstrate the substantial direct

impact that job crafting and appreciative leadership have on a workplace's sense of belonging. Additionally, there is a noteworthy direct impact of appreciating leadership and job designing on affective commitment.

5. Conclusion and Recommendations

- (i) Leadership perception: Nurses' perceptions of leadership play a crucial role in shaping their work experience, directly influencing their sense of belonging and commitment and indirectly affecting these outcomes through job-designing behaviors.
- (ii) Job crafting: Engaging in job-crafting behaviors appears to be a vital mechanism through which nurses can enhance their sense of belonging and commitment in the workplace.
- (iii) Positive work environment: Promoting a positive perception of leadership and encouraging job-building behaviors may lead to a more committed and engaged nursing workforce, which is essential for the well-being of both the staff and the patients they serve.

5.1. Implications for Nursing Management. Nurses in the hospital are likely to have high turnover intentions and feelings of disengagement. To ensure higher levels of engagement and lower turnover intentions, management could take the following actions: Nursing managers should focus on cultivating appreciative leadership behaviors, such as providing regular feedback, recognizing achievements, and fostering a supportive work culture. Training programs can be developed to enhance leaders' skills in appreciative communication, conflict resolution, and emotional intelligence. Organizations can encourage the creation of jobs among nurses by offering opportunities for autonomy, skill development, and flexibility in job roles. Policies and practices should align with the principles of appreciation leadership and job crafting, focusing on the importance of employee well-being, engagement, and professional development. These actions are crucial to reducing turnover intentions and disengagement among nurses on the staff.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request. Also, all data generated or analyzed during this research are included in this manuscript.

Ethical Approval

The Faculty of Nursing Ethics Committee granted ethical approval (No. 21-2-2023). Potential ethical concerns such as participant well-being, privacy, and anonymity were upheld throughout the research procedure. Participants were informed of all study-related material and their ability to withdraw at any point while the study was in progress. Furthermore, only the authors had access to the sensitive participant data, which was held in a locked, secured cabinet.

Lastly, everyone had the guts to raise any pertinent queries. The authors confirm that all the methods were performed in accordance with the relevant guidelines and regulations.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Barriers and Facilitators to Coping with Second Victim Experiences: Insights from Nurses and Nurse Managers

Xizhao Li ^{1,2} Mei-Chan Chong ¹ Chong-Chin Che,¹ Yamin Li ² Ling Wang,^{2,3} Alan Dong,² and Ziqing Zhong²

¹Department of Nursing Science, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia

²Clinical Nursing Teaching and Research Section, The Second Xiangya Hospital, Central South University, Changsha, China

³Florence Nightingale Faculty of Nursing, Midwifery and Palliative Care, King's College London, London, UK

Correspondence should be addressed to Mei-Chan Chong; mcchong@um.edu.my

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Background. Second victim experiences have long-term impacts on the personal and professional well-being of nurses. Individual-centered support is necessary to help nurses cope with the various stages of the second victim experience. **Objectives.** To explore personal and workplace factors that facilitate or hinder coping styles for second victim experiences from the perspectives of both frontline nurses and nurse managers. **Design.** This was a descriptive qualitative study that incorporated semistructured interviews. **Methods.** Purposive sampling was employed to enlist a total of eight nurses and seven nurse managers selected from five tertiary hospitals located in Hunan Province, China. The study participants included nurses who had suffered second victim experiences and nurse managers who had grappled with their nurses' second victim experiences. The data were transcribed verbatim and analysed using thematic analysis. **Results.** The analysis revealed four main themes that influenced nurses' ability to cope with second victim experiences: source of emotional trauma, personal factors, job stress, and support system. In contrast, emotional trauma from patients and relatives, negative personal traits, shadows from the second victim experience, and unsupportive workplace environments were obstacles to coping with second victim experiences. **Conclusion.** The study highlights facilitators and barriers that nurses cope with second victim experiences, providing insight to develop targeted interventions that support nurses and mitigate the negative impacts of second victim experiences. A comprehensive approach is more effective in supporting nurses in coping with second victim experiences, improving patient safety, and enhancing the quality of care.

1. Introduction

According to the Lancet Global Health Commission, patient safety issues remain a critical challenge worldwide, with 134 million adverse events occurring annually in low- and middle-income countries [1]. In China, adverse event reporting is a crucial criterion for evaluating patient safety in hospitals, but it often lacks effective support systems for nurses, resulting in punishment and isolation [2, 3]. Despite the continuing challenge to nurses of an unprecedentedly burdened, complex, and ever-changing work environment [4], the specific personal and workplace factors that arise during adverse events are still unknown.

Over the past two decades, nurses encountering adverse events have been characterized as “second victims.” This term describes nurses who undergo emotional and psychological distress following such events, which can significantly impact their well-being and professional performance [5, 6]. Studies have indicated that more than two-thirds of nurses involved in second victim experiences troubling memories, anxiety, anger, and distress. Troubling memories were found to be the most prevalent symptom, with a frequency of 81% [5]. The most commonly reported symptom among nurses involved in second victim experiences was hypervigilance, and doubts about their skills and knowledge were also reported frequently [7]. Furthermore,

the research found that the symptoms of second victim experiences were more enduring and severe among nurses than physicians [8]. The COVID-19 pandemic exacerbated the stress and anxiety faced by nurses, including challenges to their health [9]. As reported, empowering nurses with confidence, tools, and skills is critical to improving patient safety and could result in 1,000 lives saved each year by 2024 [10]. Gaining insight into the obstacles and requirements faced by nurses impacted by second victim experiences is crucial for aiding their recovery and progression [11].

Additionally, there is a lack of evidence on effective coping styles for nurses in second victim experiences. Coping refers to the thoughts and behaviours that individuals use to manage the internal and external demands of stressful events [12]. Several studies have highlighted that nurses may struggle with effective coping with second victim experiences due to poor awareness and delayed access to support programmes. For example, Edrees et al. [13] found that delays in receiving support programmes were a theme related to coping with second victim experience among nurses. Similarly, previous studies reported that seeking support and forgiveness from peers and managers was a common coping strategy among nurses [14, 15]. However, there is a lack of literature that provides a comprehensive understanding of the specific personal and workplace factors that influence coping among nurses in second victim experiences, highlighting the need for further research. Moreover, a recent study by Steven et al. [16] highlights the importance of coping as a significant professional practice for nurses in managing emotional and relational tension in clinical settings. However, existing literature has only briefly addressed the tendency to delay accessing support programmes in second victim experience, which can lead to a worse professional quality of life and negative consequences for patient safety [17, 18]. While a mixed methods systematic review by Pollock et al. [19] found that awareness of frontline workers' needs can facilitate mental health support, minimal research has focused specifically on the coping process of second victim experiences, especially from the perspectives of nurses and nurse leaders. Studies have shown that nurse managers play a crucial role in maintaining a creative work environment and the well-being of patients and nurses, but constraints such as time, workload, and resources can lead to poor communication, condescending attitudes, and bullying towards nurses [20, 21]. Moreover, nurse managers themselves can also experience negative effects when supporting nurses involved in second victim experiences [13], underscoring the challenges nurse managers face in maintaining their well-being while assisting their staff. It is therefore presumed that the well-being of nurse managers and their experiences of stress and emotional challenges may exacerbate the causes of poor mental health among nurses.

This study results emphasize the significance of comprehending the factors that influence coping strategies in nurses who undergo second victim experiences, taking into account the viewpoints of both the nurses and their nurse manager. This research centers on identifying the barriers and facilitators that shape coping styles among nurses who

have endured second victim experiences. Additionally, it aims to offer empirically grounded insights that can aid in crafting effective coping styles. These styles are designed to equip and support nurses in managing the challenges associated with second victim experiences.

2. Method

2.1. Study Design. This study utilised a descriptive, qualitative approach through individual face-to-face semi-structured interviews. The study recruited nurses as participants from tertiary care hospitals using purposive sampling, while nurse managers were identified through snowball sampling. This process continued until data saturation was reached, indicating that no new information could emerge from the data. [22]. The data collected were analysed using Braun and Clarke's [23] method of thematic analysis in NVivo Version 12, based in Lumivero, USA. The researchers followed the report guidelines of consolidated criteria for reporting qualitative research [24]. To prevent any unintended impact from relationship dynamics, there were no pre-existing relationships among the researchers, nurses, or nurse managers involved in the study.

2.2. Participants. The research was carried out in five tertiary hospitals in Hunan Province. Nurses and nurse managers who had previously participated in an online survey regarding second victim experiences and agreed to share their insights were involved in this study [25]. Furthermore, nurse managers were enlisted through snowball sampling, leveraging referrals from participating nurses and existing nurse managers within the study. The criteria for selecting nurses included the following: (1) had second victim experience and (2) at least one year of being employed full-time. For nurse managers, the criteria were as follows: (1) holding a pivotal leadership role within the hospital's nursing team, tasked with overseeing nursing operations in a medical unit, which encompasses planning work schedules, supervising the implementation of nursing care, mentoring junior nurses, and facilitating communication between doctors and patients and (2) having experience in providing support to nurses who have faced second victim experiences. The researcher (XZ) contacted and invited participants who had completed an online survey on second victim experience between 2021 and 2022. A total of 15 participants, comprising 8 nurses and 7 nurse leaders, were interviewed individually to obtain their perspectives.

2.3. Research Team Characteristics. The research team was exclusively female and consisted of three nurses (XZ, LW, and ZQ), two nurse managers (YM and AL), and two nursing science lecturers (CMC and CCC). Nurse XZ was a PhD candidate at the University of Malaya, LW was a PhD candidate at King's College London, and ZQ was a master's student at Central South University. Three team members (CMC, CCC, and YM) hold a PhD qualification and have expertise in qualitative research. The nursing science lecturer CMC, an Associate Professor at the University of Malaya,

has extensive experience in qualitative analysis and is not affiliated with the hospital to avoid any potential impact from relationship dynamics.

2.4. Data Collection. Data were collected between February 2022 and August 2022. Participants were recruited through an advertisement on a WeChat page that provided information about the study, and interested individuals were screened for eligibility criteria before providing consent to participate. The interviews were conducted by XZ at a mutually convenient time and location for the participants. Nurses LW and ZQ were the field note-takers, with LW joining the interviews with participants identified as RN01–08 and ZQ joining the interviews with participants identified as NL01–07. Each interview lasted between 40 and 60 minutes and was audio recorded. The interviews took place in the medical unit's designated rest area, which is furnished with a comfortable sofa and provides a quiet atmosphere. Participants were able to book the rest area for at least an hour and had the option to lock the door during the interview for privacy. The interviews were scheduled for either noon or after the participants' duty hours to ensure their availability. The interviews aimed to obtain insights into the barriers and facilitators of coping with second victim experiences among nurses. Demographic data were collected, including the gender, age, length of working experience, position, title, medical unit, and education level. The interview guide was developed by the authors (XZ and LW) based on the previous literature and is presented in Table 1. To ensure consistency, all interviews were conducted by XZ. Data collection was considered completed when data saturation was achieved. Audio recordings of the interviews were transcribed verbatim immediately.

2.5. Data Analysis. This study followed the six-step thematic analysis method developed by Braun and Clarke [23] and utilised NVivo v12 to manage and analyse the qualitative data. The data were transcribed and anonymised before being coded by XZ and LW independently for each participant. The first step involved familiarising the researchers with the data sets and generating initial codes. To ensure completeness, the coded data were compared with the transcripts and returned to the participants; there are no comments and corrections from the participants. The third step involved identifying potential themes, which were reviewed and refined during the fourth step. Several rounds of discussion were conducted to ensure the representation, consistency, and accuracy of the themes. The refined themes were then converged to ensure consistency and accuracy. The fifth and sixth steps involved defining and naming the themes and presenting thematically the results of the study. The thematic presentation aimed to provide an in-depth understanding of the facilitators and barriers that nurses face when coping with second victim experiences. The rigorous analysis approach helped to ensure the trustworthiness and reliability of the findings.

2.6. Rigour and Trustworthiness. To increase the credibility of the findings, this study used member checking and peer debriefing. Member checking involved presenting the research findings to participants to confirm accuracy and receive feedback, while peer debriefing involved other researchers reviewing the study design, data collection, and analysis.

Triangulation was used to increase the understanding of the phenomenon. Triangulation is important when studying frontline nurses and nurse managers because it recognises the differences in their roles and responsibilities. These roles often result in different understandings, priorities, and perspectives between the two groups. Moreover, this approach entails gathering and analysing data from various sources, encompassing both interviews and observations. Observational methods enable researchers to capture data that participants might not readily convey in interviews, thereby offering a more comprehensive perspective on the phenomena being investigated. This holistic approach aids in fostering a dependable understanding of perceptions regarding the second victim experience. This triangulation approach significantly increases the validity and rigour of the research findings [26].

The utilization of observation notes during data collection involves three primary stages, encompassing both interviews and observational methods. Initially, after transcription, observation notes are amalgamated with interview transcripts. These annotated records, serving as observational insights, are seamlessly integrated into the transcribed manuscripts, enriching the initial coding phase with a comprehensive perspective. Subsequently, the transcribed manuscripts and observation notes undergo review with research participants to elucidate any potential ambiguities in conveyed meanings. Once themes are established, they undergo further examination in conjunction with observation notes to validate and refine emerging patterns. The incorporation of observational data throughout this methodology significantly enhances thematic analysis, fostering a deeper understanding and more nuanced insights. Post-transcription, the integration of observations with interview data affirms the coherence and expansion of emerging themes across diverse data sources.

The researchers (XZ and LW) compared the information gathered from each source. By including the perspectives of both frontline nurses and nurse managers, this study was able to gather a complete understanding of the facilitators and barriers to coping with second victim experiences. In addition, member checking was used as a verification technique upon the full development of themes, thereby bolstering the validity of the research findings.

2.7. Ethical Consideration. Before conducting this study, ethical approval was obtained from the Research Ethics Committee at the Second Xiangya Hospital of Central South University (no. LYF2022003). All participants were provided with research statements, and informed consent was obtained, with opportunities for questions and the right to withdraw from the study at any time. This study was

TABLE 1: Interview guide.

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- (1) What are some of the most challenging adverse events you (your colleagues) have experienced in your career?
 - (2) How did it affect you (your colleagues)?
 - (3) How did you (your colleagues) cope with the events?
 - (4) How did the organisation manager manage the events?
 - (5) How did interactions between you and your team influence your experiences?
-

conducted following ethical principles and guidelines for research involving human subjects. Participants who experienced psychological distress and wished to receive help would be evaluated by project team members and provided with assistance. If any discomfort arose during the interview process, participants could contact a mental health professional from the Department of Psychiatry at Xiangya Second Hospital, Central South University, at 0731-85295555, if necessary.

3. Results

3.1. Demographic Characteristics of Participants. Table 2 presents the demographic characteristics of the 15 participants in this study. The majority of the study's participants were female, comprising 93% of the sample, while male participants constituted a smaller portion at 7%. The average age of the participants was 38.9 years, and they had an average professional experience of 16.7 years. Nearly half of the participants (47%) held advanced professional titles, and 40% had intermediate titles. The most represented medical units were internal medicine and surgery, each contributing a third of the participants, followed by a smaller percentage in specialties such as paediatrics, obstetrics, and gynaecology, which accounted for 13%. In terms of educational background, 20% of the participants, amounting to 3 individuals, possessed a bachelor's degree, whereas the majority, 80% or 12 participants, held a master's degree.

3.2. Themes and Subthemes. This study aimed to explore personal and workplace factors that facilitate or hinder coping styles among nurses who have second victim experience. It employed a thematic analysis of semistructured interview transcripts, which resulted in 4 main themes and 12 subthemes (Table 3). The 4 main themes that emerged from the analysis were the source of emotional trauma, personal factors, workplace environment, and support systems. Each theme was further divided into subthemes, providing more specific information from both nurse and nurse manager perspectives.

3.2.1. Source of Emotional Trauma. In the second victim experience, nurses are exposed to trauma from different sources that can impact their coping styles.

(1) Patients' Consequences. When patients experience adverse consequences, nurses often internalise a sense of

responsibility, leading to guilt and self-blame. This emotional burden can intensify feelings of stress and anxiety and impede their ability to cope effectively.

NL02: Their blood pressure is too high! and then, er. . . the patient told me, uncomfortable and crappy, you know what I mean? It's so dangerous. . . If it is not dealt with in time, the consequences will be disastrous.

(2) Response of Patients' Relatives. Patients' relatives can respond in various ways, including hostility, blame, denial, or lack of cooperation. These responses can increase the nurse's stress and emotional distress, leading to feelings of anger, resentment, and burnout.

NL05: The family, in fact, had similar views to his; that is, the family couldn't understand, and was also very anxious, er. . . like can't listen to the explanation, very angry.

3.2.2. Personal Factors. This refers to individual traits, experiences, abilities, and attributes that may influence how a nurse copes with the second victim experience.

(1) Personality. Sensitivity may lead to increased emotional distress. However, positive thinking may help nurses find meaning and purpose in their work, contributing to their well-being.

RN07: Having worked for over ten years, and I'm a relatively sensitive and fragile person, the way I deal with this, always be impressive in my mind.

RN05: I was shocked, and I have learned a lesson from this incident, so I will not handle this pipeline problem recklessly again. In the future, I will take the initiative to ask the seniors to look at any problem that I think I am not sure about or any problem of this kind.

(2) Shadows of Experience. It highlights personal factors following adverse events that affect how nurses cope with the second victim experience, referring to the emotional, physical, occupational, and long-term consequences that negatively affect coping styles.

Emotional echoes: Nurses experiencing anxiety and fear lead to avoidance coping styles, while those dealing with guilt might adopt more conflictual coping styles.

TABLE 2: Demographic details of participants (N = 15).

Variable	Category	%(N)/mean ± SD
Gender	Female	14 (93)
	Male	1 (7)
Age (years)		38.9 ± 8.5
Years of working		16.7 ± 9.1
Title	Junior	2 (13)
	Intermediate grade	6 (40)
	Advanced title	7 (47)
Medical unit	Internal medicine	5 (33)
	Surgery	5 (33)
	Paediatrics, obstetrics, and gynaecology	2 (13)
	Acute and intensive care	3 (20)
Education level	Bachelor	3 (20)
	Master	12 (80)

TABLE 3: Themes and subthemes of the study.

Themes	Subthemes
Theme 1. Source of emotional trauma	1.1. Patients' consequence
	1.2. Response of patients' relatives
Theme 2. Personal factors	2.1. Personality
	2.2. Shadows of experience
	2.2.1. Emotional echoes
	2.2.2. Physical reaction
	2.2.3. Occupational challenges
Theme 3. Job stress	2.2.4. Enduring silence
	3.1. Workload
	3.2. Ineffective management
	3.3. Organisational culture barriers
	3.3.1. Inadequate awareness
Theme 4. Support system	3.3.2. Punishment effects
	4.1. Supportive network of colleagues
	4.2. Continuous professional development
	4.3. Availability of referral resources
	4.4. Family and community support

RN07: After the incident, but er... There was, at the time, a lot of nerves...and when I'm wrong, it's really aggravating, scary and helpless.

Physical reactions: Physical discomfort or illness may limit the energy and resources available for coping, leading to a preference for less active or avoidance-based styles.

RN04: Just sitting on the floor, crying ah. Sometimes, sometimes sitting on the bed without moving, can really sit for 12 hours without eating or drinking.

Occupational challenges: To highlight how adverse events can damage nurses' confidence in their clinical skills and decision making, impact their professional identity, and lead to negative coping styles as a result of avoidance.

NL03: Eventually, for a while, I did notice that she was kind of wandering around at work. Then she said she wasn't right for the position... She mentioned resigning later. She wrote her resignation letter anyway.

Enduring silence: It suggests that nurses' struggle with unresolved emotions without effective processing may exacerbate chronic worrying and rumination, thereby influencing the adoption of negative coping styles.

RN05: It was about, over 10 years ago, and I am still so sad, every time I mentioned it, oh my God...

NL02: But, that long process is really completely insomnia, that is the bad event for her to cause this kind of damage, this event for her this life is really to be engraved in the heart, afraid to mention to anyone to talk about.

3.2.3. *Job Stress.* The physical and psychological conditions of the work setting can affect nurses' response to the second victim experience, including organizational culture, job demands, and workload.

(1) *Workload.* It refers that the high level of workload led to avoiding the stressor.

RN01: Some time ago, because of the lack of manpower and the seriousness of the patient's condition, during the New Year, there were more unplanned extubating, for example, It seems that we can't change anything, out of control, hard to believe. . .

(2) *Ineffective Management.* This refers to a situation where the management fails to provide adequate resources, support, and guidance to nurses in dealing with the second victim experience.

RN01: To report adverse events, you must do courseware and PPT, and all nurses involved should report. . . It will increase the workload, and everyone will be very stressful. . .

(3) *Organisational Culture Barriers.* Cultural barriers within a healthcare organisation can hinder the ability of nurses to manage the second victim experience effectively.

Inadequate awareness: Insufficient knowledge or comprehension of the second victim experience escalates the risk and hampers the capacity to cope effectively.

NL03: Regardless of whether there are consequences or not, it really feels like an adverse event, and an adverse event is that I did not do well. . .

Punishment effects: Punishing nurses without a supportive environment can lead them to develop unhealthy ways of coping with the stress and emotional impact of second victim experiences.

RN03: In fact, at that time, I have the feeling that there are no set rules and regulations when it comes to punishment; it's more like decisions are made on the basis of the thoughts of the heads of medical units or nursing units, without a clear basis. . .

3.2.4. *Support Systems.* Support systems can play a critical role in how nurses cope with the second victim experience, and they refer to networks of individuals, groups, and organizations that provide emotional, practical, and informational support to nurses.

(1) *Colleague Network.* A colleague network for nurses refers to a group of colleagues who can provide support to the nurse in the second victim experience, including practical advice and emotional support.

RN07: The support of the nurse managers and the doctor, for example, the doctor went to help the patient, and after explaining and apologising together, the attitude of the patient eased up. My, this emotion, this nervous anxiety, this helpless emotion, There is a noticeable decline.

(2) *Continuous Professional Education.* This refers to ongoing education and training on skills and knowledge related to reviewing adverse events. Such education can help nurses

gain a better understanding of the second victim experience and how it can be prevented. It includes understanding the signs of mental health conditions, knowing how to seek help, and recognising the importance of wellness.

RN04: I hope he can guide me in the future, when I encounter such accompanying family members, guide nurses on how we should skilfully resolve this conflict.

NL05: You analyse it, you analyse it all, you do it all, and the next time he'll know how, yeah. . . How to understand this matter. I'm going to handle it, how I'm going to do it. I'm not going to be passive, and I'm going to be proactive. . . Especially, I can accept myself as a nurse, and I also need to seek help.

(3) *Availability of Referral Resources.* This refers to the presence of adequate resources that can assist the nurses in effectively coping with second victim experiences, such as time and mental health services.

NL03: During the rest time, we would accompany her to see a doctor later. . . After talking with the director, I also talked to a few members of our nursing core team about this matter, for protecting. . .and helping her.

(4) *Family and Community Support.* This refers to the role that family members and the community can play in supporting nurses who are involved in the second victim experience.

RN08: But in the end, I still face it by myself. Of course, my family has always supported me. Even if they don't study medicine, they are not very capable. They are very clear about the whole process, but they will accompany me.

4. Discussion

The findings of this study underscore crucial elements that can either hinder or aid nurses in dealing with second victim experiences. These factors play a significant role in influencing how nurses manage and recover from such challenging situations. Although qualitative studies from various countries, such as Australia, Switzerland, and the United Kingdom, highlight the significance of individual-centered coping styles that are based on the different stages of the second victim experience [11, 27, 28], there is still a lack of in-depth evidence on the factors that impact these coping styles. This study considered the perspectives of both nurses and nurse managers and identified several dimensions that play a role in the coping process. The results of this study indicate that coping with second victim experiences is shaped by emotional trauma origins and personal traits. Additionally, the study uncovers that workplace-related challenges significantly add to the stress of second victim experiences, consequently impeding the efficacy of the coping process for nurses. Conversely, a multilevel

support system is unanimously recognized by both frontline nurses and nurse managers as a critical facilitator in managing second victim experiences. This comprehensive support structure plays a pivotal role in aiding nurses to effectively navigate and cope with the challenges arising from these experiences.

The theme of the source of emotional trauma in this study revealed a complex association between patients' outcomes, relatives' responses, and the second victim experience among nurses. It emphasizes that patients' consequences directly impact the nurses, aligning with studies indicating that nurses can feel responsible for patient consequences and fear disciplinary action, leading to negative coping strategies such as avoidance, denial, or self-blame [6]. Researchers have identified marked disparities in how adverse events are perceived by nurses, patients, and their families [29, 30]. Additionally, difficulties in the interactions between nurses and patients' relatives have been documented in a qualitative meta-analysis [31]. This study further emphasizes the deep-seated connection between patients' relatives and nurses who have gone through second victim experiences. The participants of this study shared that relatives often undergo feelings of anger, grief, and loss after adverse events, and these emotions are frequently projected onto the involved nurses. In some cases, this can escalate to legal actions, which intensify the nurses' challenge in coping with their second victim experiences. These observations underscore the necessity for healthcare organizations to enhance communication and coordination following adverse events [32, 33]. Implementing standardized procedures that enable nurses to effectively communicate about adverse events and ensure patients' families have a clear understanding of what occurred can help mitigate blame and conflict. Such measures could significantly improve nurses' ability to manage and recover from second victim experiences.

This study has pinpointed several personal factors such as personality and overall damages from adverse events as crucial determinants influencing the coping styles of nurses. To begin with, personality traits have a significant impact on how nurses handle second victim experiences [34]. It has been observed that participants who exhibit positive thinking are generally more adept at coping with these experiences. Supporting this, prior research indicates that nurses often display higher levels of extroversion compared to professionals in other fields, which can influence their coping methods [35]. However, the study also notes that nurses with high sensitivity might experience increased emotional distress when dealing with second victim experiences, indicating a nuanced relationship between personality traits and coping effectiveness. These findings align with those of previous research, which indicates that nurses can feel threatened when there is a significant disparity between their expectations and reality [36]. Importantly, some participants—three nurses and two nurse managers—revealed that even though as many as 15 years have passed since the second victim experience, the sadness, fear, and anxiety of the event still lingers as they recount their experiences. Some of the nurse managers reported long-

term effects such as depression and career changes. Findings in the shadow of experience add to the growing evidence that multiple harms following adverse events significantly influence coping styles. [8, 37]. It highlights the need to break the cycle of silence and promote healing of emotional, physical, and professional dimensions, as well as ongoing reflection to recover from trauma.

The third theme in this study emphasized the challenges related to the job stress for nurses in coping with the second victim experience; in particular, it highlights the recognition of the burdens posed by the intricate nature of the prevailing management processes. Some participants of this study reported that high levels of workload cause nurses to experience higher levels of stress, leading to increased negative coping to the second victim experience. Significantly, convoluted reporting processes during adverse events can subject nurses to pressure and a lack of support within the context of the second victim experience. In turn, it can lead to deficient factor analysis and the adoption of ineffective coping styles [38]. Furthermore, the findings of this study suggest that in the absence of these supportive mechanisms, nurses may face difficulties in effectively processing their emotions and experiences. This challenge could potentially result in prolonged psychological distress, an increased risk of burnout, and could even lead to nurses leaving the profession. The importance of adequate support structures is thus underscored, as they are critical in helping nurses navigate the complexities of their experiences and maintain their mental health and career longevity. A ten-year national survey recommends the importance of fostering a supportive work environment where nurses feel valued and heard and where they can openly discuss their experiences and receive appropriate support to cope with the emotional impact of the second victim experience [39].

Theme four of this study highlights the most significant findings in facilitating coping with the second victim experience among nurses. The study discovered that having a network of colleagues is advantageous, echoing findings in the existing literature that highlight how colleague networks are integral to shaping an organization's culture and in providing a safe environment for expressing emotions. Previous research has underscored that when nurses are part of a supportive peer network, they feel more empowered to manage complex situations without fear of judgment or criticism [28]. However, an interesting point raised by participants in this study, which appears to be underrepresented in current literature, is that the most immediate and effective support often comes directly from colleagues. This aspect emphasizes the crucial role of peer support in the immediate aftermath of challenging incidents, indicating a potential area for further exploration and emphasis in future research and organizational policies. Continuous professional education is revealed in this study, as Goh et al. [40] and Davis et al. [41] supported that it is crucial for maintaining resilience, collaborative practice, and patient safety. Previous studies have similarly demonstrated a link between mental health literacy and adaptive coping styles [42, 43]. Enhancing mental health literacy among nurses can better prepare them to manage the emotional

challenges associated with the second victim experience. Continuous learning and skill development can empower nurses to effectively navigate the demands and stressors of these experiences. Moreover, the findings from our study suggest that mental health literacy can also benefit nurse managers in supporting nurses during complex situations. Younas et al. [21] revealed that mental health literacy plays a crucial role in enabling nurse managers to address their emotions effectively and implement successful management strategies. The concept of the second victim remains a topic of debate, with some critics such as Tumelty [44] arguing that it might detract from the focus on patient harm. Despite these contentions, findings from this study reveal that frontline nurses often face a lack of clear guidance on how to seek help for second victim experiences, which can lead to the adoption of negative coping mechanisms. On the other hand, nurse managers are in favor of creating a structured referral system. Such a system, as suggested by Norvell et al. [45], would be designed to swiftly identify nurses experiencing second victim phenomena and provide them with appropriate mental health services. This approach could potentially bridge the gap between the immediate needs of affected nurses and the long-term goal of maintaining high standards of patient care, while also addressing concerns about the potential overshadowing of patient harm. This can ensure that nurses receive timely and appropriate care and support to cope with the emotional and psychological effects of their experiences. In Chinese culture, both family and community constitute fundamental pillars of an individual's support system [46, 47]. In addition, it is imperative to recognise that nurse managers, who simultaneously occupy family roles as mothers, wives, and daughters, play a central role in providing immediate support to fellow nurses. Consequently, the findings underscore the importance of a robust support system, including both family and community, that not only assists nurses with guilt and anxiety but also provides nurse managers with an essential resource that facilitates their prompt and effective support of nursing staff.

4.1. Strengths and Limitations. The strengths of this study are its rigorous qualitative design and triangulation. Frontline nurses are the ones directly involved in the second victim experience, while nurse managers have a broader view of the organizational context. By including both perspectives, this study demonstrates that coping with second victim experiences is not only a personal issue. It is also influenced by organizational and managerial factors.

Limitations include potential selection bias from different experience timeframes and gender bias. This highlights the need for ongoing research and interventions to support nurses in coping with second victim experiences.

5. Conclusion

The findings from this study strengthen the understanding of facilitators and hurdles in managing second victim experiences as reported by frontline nurses and nurse

managers. It highlights the critical need for a comprehensive approach involving patients, their families, and healthcare institutions. By incorporating an understanding of multiple factors influencing dealing with the second victim experience, we can develop interventions that address multiple aspects to support effective coping styles among nurses.

Data Availability

The datasets generated during and/or analysed during the current study will be shared only on request with the approval from the Universiti Malaya.

Ethical Approval

The procedures used in this study adhere to the tenets of the Declaration of Helsinki. This work was approved by the research Ethics Committee in the Second Xiangya Hospital of Central South University (no. LYF2022003).

Consent

The participants agreed to the informed consent before starting to fill in the questionnaire. Informed consent was obtained from all participants included in the study, which was a completely voluntary, anonymous, and unrewarded study.

Disclosure

AI Use. No AI has been used in the preparation of the manuscript.

Conflicts of Interest

The author(s) declare that they have no conflicts of interest.

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Research Article

The Barriers and Facilitators Influencing Nurses' Political Participation or Healthcare Policy Intervention: A Systematic Review and Qualitative Meta-Synthesis

Nam Kyung Han ¹ and Gwang Suk Kim ²

¹Department of Nursing, Gyeongsbuk College of Health, Daehakro 168 Gimcheon City, Gyeongsbuk 39525, Republic of Korea

²Mo-im Kim Nursing Research Institute, College of Nursing, Yonsei University 50-1 Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea

Correspondence should be addressed to Gwang Suk Kim; gskim@yuhs.ac

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Background. Nurses, who comprise the largest proportion of healthcare professionals, must advocate for public health in a changing healthcare environment. Therefore, nurses have a social responsibility to be interested in politics, political participation, or healthcare policy interventions as leaders in healthcare policy reforms. However, previous research has reported that nurses' political interests and participation are insufficient in most countries. **Aim.** This study systematically reviewed and synthesized qualitative data to identify the barriers and facilitators influencing nurses' political participation and healthcare policy interventions. **Methods.** This study performed a systematic review and qualitative meta-synthesis. Literature searches were conducted using seven databases to comprehensively examine published journals, including doctoral dissertations, until December 31, 2023. The selection criteria for this study were articles analyzed using phenomenology, ethnography, qualitative research, and grounded theory, targeting nurses with extensive experience in healthcare policy intervention and political activities. Two researchers, professors in nursing with extensive experience in healthcare policy interventions and qualitative research screened the qualitative studies and extracted the data. Eighteen papers were analyzed, and the quality of each study was evaluated using the Critical Appraisal Skills Program Qualitative Checklist. Meta-ethnography was applied as the qualitative meta-synthesis method using ATLAS.ti. **Results.** Barriers include nurses' lack of political interest and competence, nursing education, restrictive organizational cultures, and the nursing profession's political activities. Facilitators include recognizing social responsibilities, enhancing political competence, innovating organizational environments, and strengthening nursing organizations' political activities and policy interventions. **Conclusions.** This study could be used as data to enhance nurses' political participation and to plan policy interventions and strategies. **Implication for Nursing Management.** To activate nurses' political participation in the future, it is necessary to develop strategies, such as developing nursing political education programs and expanding opportunities for policy intervention.

1. Introduction

Since the United Nations (UN) introduced 17 sustainable development goals (SDGs) in 2015 [1], the World Health Organization (WHO) has encouraged countries to reform healthcare policies and achieve key health-related SDGs [2]. Furthermore, the UN and WHO emphasize the need to enhance healthcare professionals' political participation and

healthcare policy intervention based on their social responsibility to accomplish the SDGs [2].

Politics is an authoritative distribution of social values [3], and healthcare professionals can contribute to the effective maintenance and development of a limited-resource healthcare system through political participation and policy interventions in policy-making processes [2]. Political participation is defined as activities that directly or indirectly

influence government policies, such as election voting, election campaigns, rallies, legislative lobbying, and petitions [4]. Regarding this, 27.9 million nurses, accounting for approximately 59% of the world's largest healthcare workforce [2], must advocate for public health and nurses' rights in a changing healthcare environment, as specified by the International Council of Code of Ethics for Nurses [5]. In addition, nurses have a social responsibility to be interested in politics and to engage in political participation or policy interventions as leaders in healthcare policies [6–9]. In this regard, analytical studies have been reported in some countries, such as the United States, South Korea, and Iran, on the activities and successes of nurse political activists in contributing to the reform or introduction of healthcare policies [10–14]. However, it has been reported in many countries that nurses' political interest or participation is insufficient [6–9, 15]. Therefore, based on the experience of the political participation of skilled nurse activists, it is necessary to explore the barriers to and facilitators of political participation to strengthen the political competencies of nurses.

Although there have been a few systematic review studies related to nurses' political participation or healthcare policy intervention, there have been few meta-comprehensive studies, and they mainly analyze nurses' political competence or role, policy intervention, and policy advocacy experience [8, 15–18]. In this regard, Benton et al. [16] analyzed a mixed study on the status and results of research on nurses' political competence and policy pursuit. Etowa et al. [8] performed a systematic review of the significant involvement of nurses and midwives in policy development in low- and middle-income countries, focusing on their experiences. Hajizadeh et al. [15] conducted a systematic review identifying factors that influence nurses' participation in health policy-making, highlighting three main themes: nursing-related factors, management and organizational factors, and the creation of a positive work environment. Meanwhile, Fernández et al. [17] analyzed the literature on the political role of nurses over a 10-year period but did not derive the concept of barriers or facilitators to nurses' political participation or policy interventions through qualitative synthesis. In addition, the study by Chiu et al. [18] was not in terms of nurses' social and political activities but rather focused on nursing representative organizations and labor unions. Like this, most of the studies were limited to systematic reviews or scoping reviews rather than deriving concepts by meta-synthesizing individual qualitative studies on barriers or facilitators to nurses' political participation or involvement in health policy.

Therefore, this study aimed to explore the barriers and facilitators to nurses' political participation and healthcare policy intervention through a systematic review and meta-synthesis of previous studies.

2. Materials and Methods

2.1. Research Design. This study was designed as a qualitative meta-synthesis study that provides a broad understanding of social phenomena by integrating the results of qualitative research [19] to explore the barriers and facilitators

influencing nurses' political participation and healthcare policy intervention using meta-ethnography [20]. There are a variety of major qualitative meta-synthesis methods, including meta-ethnography [20], grounded theory synthesis [21], and critical interpretive synthesis [22]. Among these, the meta-ethnography method, which consists of seven stages by Noblit and Hare and is suitable for higher-level analysis and the formation of new interpretations above the discoveries of individual qualitative studies [20], was used for this study (Figure 1). The review question was as follows: what are the barriers and facilitators that influence nurses' political participation or healthcare policy intervention? This study was registered in the PROSPERO International Prospective Register of Systematic Reviews (registration ID: CRD42022346992).

2.2. Search Strategy. A systematic literature search was conducted using the CORe search electronic databases of COSI (CORe Standard, Ideal) presented by the National Library of Medicine (NLM): PubMed, CINAHL, Medline, Embase, Web of Science, and Scopus [19]. A manual search was performed using Google Scholar for a comprehensive literature search. First, two researchers, professors in the Department of Nursing with extensive experience in healthcare policy interventions and qualitative research, independently conducted preliminary searches and established a search strategy while mutually confirming the correspondence between the searched literature. The search strategy was Nurse* OR Registered nurse* OR Licensed nurse* OR Nursing staff OR Nursing personnel OR Nursing profession AND Policy OR Policies OR Politics OR Political OR Advocac* AND Empirical research OR Focus group* OR Experience* OR Qualitative* OR Interview* OR Semistructured OR Semistructured OR Unstructured OR In-depth OR In-depth OR Face-to-face OR Grounded theory OR Phenomenolog* OR Ethnograph* OR Fieldwork OR Fieldwork (see Supplementary Materials). To select articles, two researchers reviewed the title, abstract, and full text using Endnote 20 after excluding duplicate studies according to the selection or exclusion criteria. In addition, a consensus was reached on inconsistencies in this process after sufficient discussion between the two researchers (Supplementary Table 1).

2.3. Study Selection and Quality Assessment

2.3.1. Selection Criteria. Based on the PICOTS-SD criteria, the participants of this study were nurses. Articles that analyzed nursing students, non-nurses, or nurses with other healthcare professionals or politicians were excluded (Table 1). The phenomenon of interest and the main outcomes were to explore the barriers and facilitators that influence nurses' political participation in healthcare policy interventions. The search was conducted from January 20, 2021, to April 28, 2023, and targeted all journals (including doctoral dissertations) in English published before December 31, 2023. Articles on hospital organization or patient advocacy, policy analysis or development, nursing policy



FIGURE 1: The phases of the meta-ethnography approach by Noblit and Hare (1988).

education, and practical experience in nursing were excluded. This study design included phenomenology, ethnography, qualitative descriptive studies, and grounded theory. Articles on quantitative research, letters, and editorials were excluded.

2.3.2. The Result of Study Selection. A total of 35,583 studies were identified, of which 19 individual studies were included in the qualitative meta-analysis using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline [23]. The PRISMA 2020 guideline provides reporting checklist for systematic reviews by consisting of a 27-item checklist, expanded recommendations, an abstract checklist, and revised flow diagrams to reflect methodological advancements in study identification, selection, appraisal, and meta-synthesis [23]. The databases initially searched for documents were PubMed 3,781, CINAHL 6,152, Medline 6,355, Embase 9,615, Web of Science 9,379, Scopus 301, and Google

Scholar 30. After excluding 23,717 duplicate articles, the titles of 11,866 articles were reviewed. After excluding 11,090 articles unrelated to the research, the abstracts of 776 articles were reviewed. The full texts of 168 articles were then reviewed, excluding 608 articles that analyzed national health policy, hospital or long-term care institution policy, policy education, and nursing administration policy. Consequently, 149 articles that were not related to nurses' political or health policy intervention activities were excluded (Figure 2) (Supplementary Table 2). The criteria and processes for selecting studies to be analyzed were carried out in continuous discussion with two researchers. The result of the PRISMA 2020 assessment for reporting systematic reviews is in Supplementary Table 3.

2.3.3. Quality Assessment and Characteristics of the Selected Individual Studies. To evaluate the quality of the final included individual studies, this study used the Critical Appraisal Skills Program (CASP) qualitative checklist, which is commonly used to assess studies and ensure the internal validity of qualitative research meta-synthesis [24]. To reduce the bias of individual studies and secure the internal validity of meta-analyses, evaluating the quality of the primary study to be analyzed is a top priority [25]. The CASP is a tool used to evaluate the reliability, truthfulness, and rigor of qualitative research and consists of ten questions. The higher the score satisfying the questions, the more likely it was that an individual study was systematically conducted. Individual studies were evaluated based on ten questions on the CASP criteria to determine whether they were satisfied. Each researcher independently evaluated and compared the results. In cases of disagreement, consensus was reached through discussion. According to the CASP criteria, 94.7% ($n = 18$) of 19 articles met a high ($n = 17$) [7, 10, 11, 13, 14, 26–37] or high-moderate ($n = 1$) [38] level of research methodological quality (≥ 0.7), and one article [39] had a low-moderate quality level (0.5). In general, CASP score of less than 0.7 indicates low methodological quality; thus, the meta-analysis results derived from inputting individual studies whose quality has not been verified are challenging to secure internal validity; therefore, one low-quality study was excluded [39] (Table 2).

The 18 studies included in the analysis were conducted in the United States ($n = 7$), Brazil ($n = 2$), Ghana ($n = 2$), Iran ($n = 2$), New Zealand ($n = 1$), Canada ($n = 1$), South Korea ($n = 1$), Thailand ($n = 1$), and Kenya ($n = 1$). Of these, 16 individual articles used qualitative research methods: phenomenology, ethnography, grounded theory, and descriptive analysis, and two articles used mixed methods [32, 35]. For data collection, individual in-depth interviews, focus group interviews, and the Delphi technique were used through purposive sampling. Eleven articles received prior research ethical approval. The participants used in the analysis were 329 nurses, general nurses or nurse managers in hospitals, community public health nurse leaders, civic group activists, government officials, elected politicians, professors, and healthcare policy committee members or policymakers. They had extensive experiences in political activities and healthcare policy reforms in the National Assembly, public institutions, central or local governments,

TABLE 1: Selection criteria for the study.

Classification	Inclusion criteria	Exclusion criteria
Participants	(i) Nurses (ii) Registered nurses (iii) Licensed nurses (iv) Nursing profession	(i) Non-nurse occupations, healthcare personnel, healthcare profession, and other occupation (ii) Nurses with other healthcare professionals or politicians
Interventions/exposure	(i) Nurses' experiences in healthcare, political advocacy, policy intervention, policy reform, or political activities	(i) Non-nurses' experience in political participation or policy reform activities (ii) National/local government policy or political activities (iii) International policy or politics (i) Not applicable
Comparisons/control	(i) Not applicable	(i) Results of healthcare policy analysis (ii) Policy and political nursing education (iii) Factors of political involvement and political activity of nurses (iv) Effectiveness of healthcare policy reform (v) History of work experiences of the nurses (vi) Patient advocacy in the hospital (i) Articles published after December 31, 2023
Outcomes: phenomenon of interest	(i) To explore the perception of nurses about their experiences of political participation and healthcare policy reform (ii) To evaluate barriers and facilitators of political participation and healthcare policy intervention	(i) Policy and political nursing education (ii) Factors of political involvement and political activity of nurses (iv) Effectiveness of healthcare policy reform (v) History of work experiences of the nurses (vi) Patient advocacy in the hospital (i) Articles published after December 31, 2023, by each database of search
Time	(i) Articles published from the first publication to December 31, 2023, by each database of search	(i) Articles published after December 31, 2023
Setting	(i) National/local healthcare policy or advocacy or politics (i) Qualitative study (ii) Descriptive study (iii) Exploratory study (iv) Empirical research (v) Grounded theory (vi) Phenomenology (vii) Ethnography (viii) Case study (ix) Focus group interviews (x) In-depth interviews (xi) Semistructured interviews (xii) Unstructured interviews (xiii) Face-to-face interviews	(i) Organizational policy or politics (ii) Non-English papers
Study design	(i) Qualitative study (ii) Descriptive study (iii) Exploratory study (iv) Empirical research (v) Grounded theory (vi) Phenomenology (vii) Ethnography (viii) Case study (ix) Focus group interviews (x) In-depth interviews (xi) Semistructured interviews (xii) Unstructured interviews (xiii) Face-to-face interviews	(i) Quantitative studies (ii) Mixed methods' research with absent or uncertain qualitative data (iii) Not a primary study: interview, conference material, commentary, perspective, review, and letter

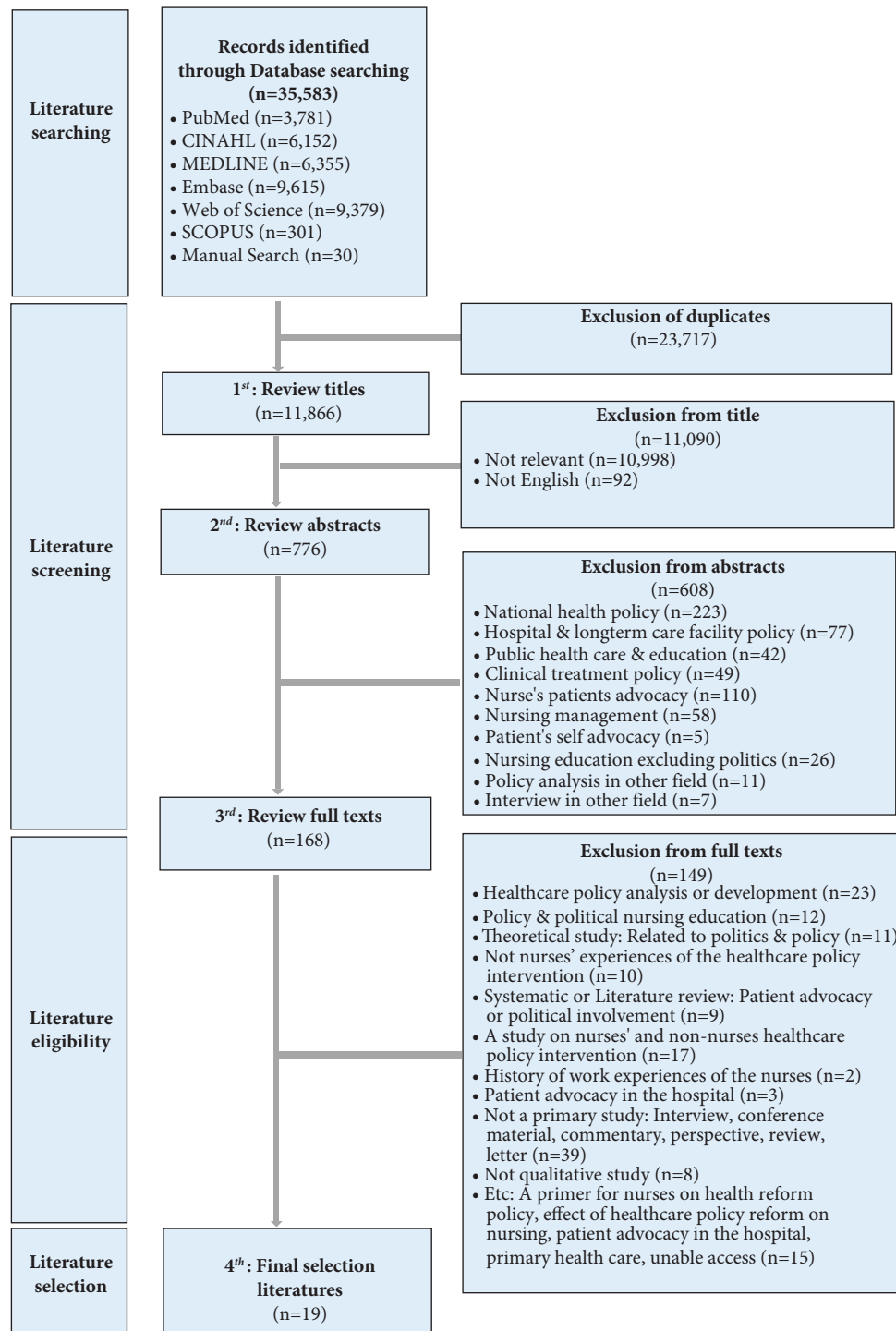


FIGURE 2: PRISMA (2020) flow diagram of the study selection process.

government committees, nursing colleges, nursing representative organizations, communities, civic groups, communities, and hospitals. The research topic explored not only the political and policy reform activities of nurses but also the concepts of barriers and facilitating factors, political competence, advocacy, and strategies based on their experiences (Table 3) (Supplementary Table 4).

2.4. Data Extraction and Synthesis

2.4.1. Data Extraction. The researchers independently extracted qualitative data for the study using the format presented by the Joanna Briggs Institute [40]. Any discrepancies between researchers during the extraction process were corrected through joint discussion. Data extraction

TABLE 2: Results of the appraisal of methodological quality by the CASP criteria.

Studies	1	2	3	4	5	6	7	8	9	10	Total	Score	Quality
Acheampong et al. [26]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Barry [27]	1	1	1	1	1	1	0	1	1	1	9	0.9	High
Declercq [39]	1	1	0	1	0	0	0	0	1	1	5	0.5	Low-moderate
Deschaine and Schaffer [13]	1	1	1	1	1	1	0	1	1	1	9	0.9	High
Digaudio [28]	1	1	1	1	1	1	1	1	1	1	9	0.9	High
Dollinger [14]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Donovan et al. [29]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Hajizadeh et al. [10]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Hajizadeh et al. [7]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Han [11]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Laari and Duma [30]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Melo et al. [38]	1	1	1	1	1	0	1	0	0	1	7	0.7	High-moderate
Rabelo and Silva [31]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Shariff [32]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Taylor [33]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Warner [34]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Wichaikhum et al. [35]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Williams [36]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Wilson et al. [37]	1	1	1	1	1	1	1	1	1	1	10	1.0	High
Total (%)	100	100	94.7	100	94.7	89.5	84.2	89.5	94.7	100			

Note. Score: <0.50: low quality; 0.51–0.65: low-moderate quality; 0.66–0.79: high-moderate quality; ≥0.80: high quality. Q1: was there a clear statement of the aims of the research? Q2: is a qualitative methodology appropriate? Q3: was the research design appropriate to address the aims of the research? Q4: was the recruitment strategy appropriate to the aims of the research? Q5: was the data collected in a way that addressed the research issue? Q6: has the relationship between the researcher and participants been adequately considered? Q7: have ethical issues been taken into consideration? Q8: was the data analysis sufficiently rigorous? Q9: is there a clear statement of findings? Q10: how valuable is the research?

was performed with reference to the categories or topics specified by the original authors, focusing on research objectives, phenomena of interest, methodology, participant characteristics, and results. ATLAS.ti version 24, qualitative data analysis software, was used to enter and categorize the data to facilitate a more systematic approach to data extraction and analysis. ATLAS.ti is a qualitative data analysis tool. Thus, it can be used to classify, sort, and code input data, which can help researchers explore and understand the nature of the phenomenon of interest. After analyzing the quotes from the individual papers in this study, 232 findings were derived: 114 barriers and 118 facilitators of nurses' political participation or involvement in health policy. The findings were then synthesized into categories of personal, organizational, and professional factors, resulting in eight themes and 22 subthemes for barriers and seven themes and 21 subthemes for facilitators (Table 4) (Supplementary Table 5).

2.4.2. Synthesis by Meta-Ethnography. In this study, a qualitative meta-synthesis analysis was performed based on the meta-ethnography [20] developed by Noblit and Hare in the field of education in the 1980s. This method clarifies the purpose and focus of the research, selects individual studies that fit the research topic, reads individual study results several times, extracts data on the characteristics and analysis of the papers, and identifies common themes and concepts. It determines the relevance between individual study results, further specifies the identified themes and concepts, translates them into each other (first- and second-order constructs), and based on this, synthesizes them into

new, more developed concepts (third-order constructs). The interpretative process compares individual research results to explore commonalities and contradictions (reciprocal translation), refutes the relevance of contradictory explanations (refutational synthesis), and uses argument-synthesis strategies to provide new insights. The final step is completed by representing the synthesized results.

The purpose and reason for using meta-ethnography were presented in the first stage of this study. In the second stage, the data were extracted using ATLAS.ti to analyze the selected individual study results after a systematic literature search of the database. In the third stage, after reading the contents of the individual studies several times, the characteristics and results of individual studies were extracted and organized on a data extraction sheet, and notes were used to identify important data. In stage 4, ATLAS.ti was used to identify the relevance and concepts of individual study results, and each author separately coded all sentences by line; if unclear, a mutual discussion process was used to reach an agreement. According to Barnett-Page and Thomas [25], the translation of research participants is classified into "first-order constructs," the researcher's translation in the primary study forms "second-order constructs," and the translation provided through qualitative meta-synthesis is classified into "third-order constructs" at various levels of interpretation. Therefore, the researchers analyzed both first- and second-order constructs to explore the barriers to and facilitation of political participation and policy intervention by nurses. Coding was repeated until the themes and concepts of the statements were clarified. Subsequently, researchers classified themes and concepts using tables to

TABLE 3: Characteristics of selected articles.

Study/country	Phenomena of interest	Design/analysis	Setting/context/culture	Participants	Data collection
Acheampong et al. [26], Ghana	Exploring the participation of nurses in healthcare policy development and reforms	Exploratory: descriptive qualitative study-content analysis	Six regions: hospitals, educational institutions, health directorate offices, and the nursing council	15 general nurses and 15 midwives in key leadership positions in their workplaces	Purposive sampling; semistructured individual interviews; open-ended in-depth interviews
Barry [27], the United States of America	Describing the political socialization processes of nurses who had attained specialized roles in the governments	Exploratory: descriptive qualitative study-analysis of responses	Positioning in congressional offices, regulatory agencies, or state legislatures, and willingness to participate	33 nurses who had attained specialized roles in public policy development in the federal and state governments	Purposive sampling; semistructured/open-ended in-depth individual interviews; face-to-face and by telephone
Deschaine and Schaffer [13], the United States of America	Identifying factors that affect the ability of public health nurse leaders to influence health policy	Exploratory: descriptive qualitative study—Longest's (2002) public policy-making framework	A city or county public health agency	Eight PHN leaders representing rural, suburban, and urban in public health nursing	Semistructured individual interviews based on Longest's (2002) public policy-making framework
Digaudio [28], the United States of America	Investigating phenomena of policy-making by nurses as experienced by those in the field	Grounded theory	At least a baccalaureate degree in nursing	20 nurses who could identify and discuss a policy-making activity they experienced	Purposive sampling; semistructured individual interviews; open-ended in-depth interviews
Dollinger [14], the United States of America	Exploring how effectively nurses function as advocates in the federal health policy process	Grounded theory	Current or past experience in the legislature or an executive branch agency of the federal government	11 registered nurses who had experience as staff in government offices, committees, or federal agencies	Purposive snowball sampling; semistructured individual interviews; open-ended in-depth interviews
Donovan et al. [29], New Zealand	Examining perceptions of policy and political leadership in nursing	Exploratory: descriptive qualitative study-constant comparative analysis	Fellows of the college of nurses who volunteered through a standard solicitation of the college, Aotearoa (NZ) Inc.	18 nurse leaders from across the country	Volunteer sampling; semistructured interviews; face to face (16 nurses), telephone (2 nurses)
Hajjzadeh et al. [10], Iran	Exploring the barriers and facilitators concerning nurse managers' participation in the health policy-making process	Exploratory: descriptive qualitative study-thematic analysis	Iranian nationality; nurses ≥25 years; a university degree; worked in administrative positions with an experience of at least 3 years in hospital	16 nurse managers who are involved based on their leadership positions and responsibilities in the hospital or governmental offices	Purposive sampling; semistructured individual interviews; open-ended in-depth interviews
Hajjzadeh et al. [7], Iran	Exploring the nurse managers' attitudes and perceived benefits in the health policy-making process	Thematic analysis	Tabriz University of Medical Sciences which has over 15 teaching hospitals northwest of Iran	16 nurse managers, government officials, and faculty members	Purposive sampling; semistructured individual interviews; open-ended in-depth interviews
Han [11], South Korea	Exploring the healthcare policy reform activities of Korean nurses engaged in civic organizations	Phenomenology	Korean civic organizations' activities for more than 5 years with a bachelor's or higher degree	Seven Korean civic activist nurses who had led successful healthcare policy reforms through policy interventions	Purposive; snowball sampling; semistructured individual interviews; in-depth interviews

TABLE 3: Continued.

Study/country	Phenomena of interest	Design/analysis	Setting/context/culture	Participants	Data collection
Laari and Duma [30], Ghana	Exploring situations that thwart nurses from performing their health advocacy role	A qualitative inductive descriptive design by Creswell and Poth; qualitative content analysis by Graneheim and Lundman	Three Ghanaian regional hospitals that served as referral, research, and teaching facilities for nurses	24 professional nurses who met the inclusion criteria in each of the regional hospitals	Purposive sampling; semistructured individual interviews; in-depth interviews
Melo et al. [38], Brazil	Identifying the conception of political participation of the nurse manager in the Brazilian public healthcare system	Exploratory: descriptive qualitative study thematic analysis	Qualified in full municipal management for at least two years and having party-political continuity	Nine manager or comanager nurses who have a position as a PHN with a leadership capacity	Semistructured individual interviews; face to face
Rabelo and Silva [31], Brazil	Identifying expression of sociopolitical knowledge, based on nurses in social movements	Foucault's framework and descriptive analysis	Social movements and women's collectives in the Metropolitan Region of Belo Horizonte, MG, Brazil	Six nurses who have experience in social movements and political representation	Nonprobabilistic and intentional sampling; semistructured individual interviews; in-depth interviews
Jivraj Shariff [32], Kenya	Exploring the extent of nurse leaders' participation and leadership attributes necessary for nurse leaders in health policy development in East Africa	Mixed method: Qualitative, descriptive, and quantitative research; qualitative analysis; statistical analysis	Three East African countries of Kenya, Uganda, and Tanzania	78 national nurse leaders who have experience in health policy development and work at the Ministry of Health, Nursing Councils, etc	Purposive sampling; 3-round Delphi method; round 1: open-ended survey questions; rounds 2 and 3: questionnaires and qualitative/quantitative data
Taylor [33], the United States of America	Eliciting insight from the public policy leaders about their current advocacy initiatives that motivate nurses	Descriptive web-based survey design; Bandura's Social Cognitive Theory (1986); inductive content analysis	Two regional professional nursing organizations were designated as expert mentors	12 executive leadership and board committee members from their respective organizations	Purposive convenience sampling; initial web-based electronic survey; semistructured web interview focuses group sessions
Warner [34], the United States of America	Identifying the skills of political competence in the stories of six politically expert nurse activists	Phenomenology	Having experience in appointed and elected office, organizational leadership, and federal healthcare reform activities	Six politically expert nurse activists	Purposive sampling; semistructured individual interviews; open-ended in-depth interviews

TABLE 3: Continued.

Study/country	Phenomena of interest	Design/analysis	Setting/context/culture	Participants	Data collection
Wichaikhum et al. [35], Thailand	Developing a strategic model of participation in policy development for nurses in Thailand	Mixed method: qualitative, descriptive, and quantitative study—qualitative analysis; quantitative analysis; validity	Having participated in policy development at the organizational or national level and/or working for nursing professional organizations with at least 10-year experience	15 nurse experts who have participated in policy development	Purposive sampling; 3-round Delphi method; round 1—open-ended individual interviews; round 2: assessing the probability of statements; round 3: finding agreement among the panel experts
Williams [36], the United States of America	Gaining understanding of the concept and practice of advocacy aimed at public policy development	Grounded theory	Working in the states in various nursing/political advocacy roles	10 nurses who were active in political advocacy as part of their nursing practice	Purposive sampling; semistructured individual interviews; open-ended in-depth interviews
Wilson et al. [37], Canada	Exploring why and how nurses became politically active and what they achieved	Grounded theory	Canadian nursing organizations to gain volunteers	10 elected or politically active Canadian nurses who had been elected to a political position	Volunteer sampling; semistructured individual interviews; telephone interviews

TABLE 4: Synthesized findings.

Categories	Themes	Subthemes	References	Findings	
<i>Barriers of political participation or policy intervention</i>					
Personal factors	Lack of political interest of nurses	Gap in political beliefs and values	[7, 11, 13, 14, 26–28, 33, 36, 37]	6	
		Lack of political efficacy	[7, 10, 11, 14, 26, 28, 33, 36, 37]	8	
Organizational factors	Lack of political competence of nurses	Lack of political knowledge and information	[7, 10, 11, 13, 14, 27–29, 33, 36, 37]	2	
		Lack of political skill	[7, 10, 11, 13, 14, 28, 29, 33, 36]	4	
		Lack of participation in activities of nursing representative organizations	[28, 33, 36, 38]	3	
	Nurses' working environment constraints	Lack of political participation	[7, 10, 11, 14, 26, 28, 29, 33, 36, 37]	2	
		Lack of awareness of the policy process	[7, 10, 11, 14, 26, 28, 29, 33, 36, 37]	4	
	Barriers to organizational culture	Poor working environments	[10, 11, 26, 28, 31, 33, 36]	6	
		Time and resource constraints	[10, 11, 14, 26, 28, 33, 36]	3	
	Stereotypes of the nursing profession	Nepotism and favoritism within the organization	Hierarchical and structural organizational culture	[26, 28, 33, 34, 36]	2
			Generation differences among nurses	[10, 26, 28, 30, 31, 33, 36, 37]	7
		Undervaluation of nurses' expertise	Gender biases	[27, 28]	2
Insufficient education and training in political competence			[7, 10, 14, 26, 28–30, 33, 36]	5	
Professional factors	Lack of political nursing education	Gender biases	[13, 26, 28, 30, 31, 33, 36, 37]	5	
		Insufficient education and training in political competence	[7, 10, 11, 14, 26–30, 33, 34, 36–38]	16	
	Limitation of support for nurses by nursing representative organizations	Lack of mentorship and legislative internship	[7, 10, 11, 26, 28, 29, 33, 36]	7	
		Insufficient advocacy efforts for nurses	[7, 28, 33, 34, 36, 37]	3	
	Lack of political power of nursing representative organizations	Deficiency of political resources and minimal encouragement for political participation	[10, 28, 29, 33, 36, 37]	5	
		Lack of political network-building and communication skills	[10, 11, 28, 33, 34, 36]	5	
	Facilitators of political participation or policy intervention	Recognition of social responsibilities	Lack of conflict management capabilities among interest groups	[10, 11, 14, 26, 28, 29, 33, 34, 36]	5
			Interaction barriers with legislators and difficulty articulating nursing perspectives	[10, 11, 14, 26, 28, 33, 34, 36]	3
		Enhancing nurses' political competence	Insufficient intervention in policy decision-making processes	[7, 10, 11, 14, 26, 28, 29, 31, 33, 34, 36, 37]	11
	Personal factors	Enhancing nursing professional values	Enhancing nursing professional values	[7, 11, 28, 30–38]	5
Awareness of healthcare problems			[7, 10, 11, 14, 27–38]	9	
Organizational factors	Innovating organizational environments	Accumulating of political knowledge, information, and skills	[7, 11, 13, 14, 27–29, 31–36, 38]	3	
		Engagement in nursing representative organizations' activities	[7, 11, 14, 27–29, 32–36, 38]	5	
Organizational factors	Participation in political activities or policy intervention	Participation in political activities or policy intervention	[7, 11, 14, 27, 28, 31–38]	9	
		Improvement of nursing work environments	[11, 28, 33, 36]	3	
Organizational factors	Postering supportive organizational culture	Postering supportive organizational culture	[10, 11, 28, 33, 36]	4	

TABLE 4: Continued.

Categories	Themes	Subthemes	References	Findings
		Development and operation of systematic nursing political education curriculum	[7, 11, 14, 26, 28, 29, 32-38]	8
	Enhancing political nursing education	Activating political nursing education for nurturing nursing political activists	[7, 11, 26-29, 33, 36, 38]	6
		Development and operation of experiential mentoring and legislative programs	[7, 11, 27-29, 33, 35-37]	5
		Strengthening evidence-based research for policy development	[7, 11, 13, 14, 28, 29, 32-36, 38]	4
	Promoting a supportive system by nursing representative organizations	Establishing a politically supportive system for nurse activists	[10, 11, 14, 28, 31, 33, 34, 36]	12
Professional factors		Enhancing cohesiveness in nursing representative organizations	[11, 13, 27, 28, 31, 33-36]	3
		Building political networking as a source of power	[7, 11, 13, 14, 27-29, 31-38]	8
		Persuasion using effective communication in the political arena	[7, 11, 14, 28, 29, 32-36, 38]	6
	Activating nursing organizations' political activities	Enhancing various political activities through developing networks	[7, 11, 13, 14, 28, 29, 31, 33-37]	4
		Formation of social opinion using media	[7, 11, 14, 28, 33-37]	9
		Development of healthcare policy reform alternatives	[7, 11, 13, 14, 27-29, 31-36]	3
	Enhancing nursing representative organizations' intervention in healthcare policy reform	Lobbying and petitioning policymakers to reflect the nursing perspective	[7, 11, 13, 14, 28, 29, 33, 34, 36, 37]	2
		Participating in healthcare policy-making process	[7, 10, 11, 14, 27-29, 31-38]	8
		Implementing and ongoing monitoring of proposed policy reform legislation	[11, 34]	2

enhance their understanding of the research phenomena and analyze the relevance and impact of each concept. In stage 5, the coding results were translated, themes and concepts were further specified to reflect the meaning of each individual study, initial codes and themes were reviewed, and similar themes were combined. As a result of the analysis, the statements of the individual study participants and interpretation authors were similar, and better information on barriers and facilitators was provided. In stage 6, the translated concepts and the relationships between them were used to create new arguments. During this process, the researchers engaged in ongoing discussions while sharing mutual feedback and insights. In the final step, the results of the synthesis of concepts using meta-ethnography are shown in the following tables (Tables 3 and 4), and the reliability of the qualitative evidence synthesis findings was tested using the GRADE-CERQual assessment [41] (Supplementary Table 6). This approach facilitated the assessment of the reliability of the results derived through the synthesis of qualitative research [41]. The authors have diverse academic backgrounds, such as majors in nursing or public health and teaching community health nursing and nursing management, as well as experience in various healthcare policy advisory roles in Korea, concept development, measurement tool development, and qualitative research. Therefore, the authors demonstrated sufficient capabilities for deriving in-depth and insightful research results during each analysis process. The result of the eMERGe reporting criteria for meta-ethnography is in Supplementary Table 7.

3. Synthesis Findings

3.1. Barriers' Factors. The eight themes were inductively synthesized as follows: personal factors (lack of political interest of nurses and lack of political competence of nurses), organizational factors (nurses' working environment constraints and barriers to organizational culture), and professional factors (stereotypes of the nursing profession, lack of political nursing education, limitation of support for nurses by nursing representative organization, and lack of political power of nursing representative organization).

3.1.1. Personal Factors. Personal barriers affecting nurses' political participation or policy interventions were synthesized into two themes and eight subthemes: the "lack of political interest of nurses" (subthemes: gap in personal beliefs and values and lack of political efficacy) and the "lack of political competence of nurses" (subthemes: deficiency of political knowledge and information, lack of political skill, lack of participation in activities of nursing representative organizations, lack of political participation, and lack of awareness of the policy process).

Most nurse activists who participated in the study stated that the "lack of political interest of nurses" was one of the personal barriers to political participation [7, 11, 13, 14, 26–28, 33, 36, 37]. In particular, it was reported that nurses' interest in political participation varies depending on nurses'

gap of political beliefs and values [7, 11, 13, 14, 26–28, 33, 36, 37], and it tends to be low due to the lack of political efficacy of nurses' political participation influencing the field of healthcare policy [7, 10, 11, 14, 26, 28, 33, 36, 37].

They also reported that most nurses' "lack of political competence" [7, 10, 11, 13, 14, 27–29, 33, 36–38] is due to the lack of political knowledge and information [7, 10, 11, 13, 14, 27–29, 33, 36, 37] regarding political processes, policy development, and advocacy strategies, as well as lack of political skills such as communication skills and political networking [7, 10, 11, 13, 14, 28, 29, 33, 36]. In addition, although healthcare policy interventions were feasible to maximize the strengths of individual nurses through collective action [34], they face a limitation that nurses' lack of participation in activities of nursing representative organizations diminishes their collective voice in policy-making [28, 33, 36, 38]. The lack of political participation reflects nurses' minimal involvement in political activities, such as advocacy, lobbying, and interaction with legislators or policymakers [7, 10, 11, 14, 26, 28, 29, 33, 36, 37]. In addition, nurses' lack of awareness of the policy process, without a clear grasp, may make them ill-equipped to contribute to policy discussions or effectively advocate for policy changes [7, 10, 11, 14, 26, 28, 29, 33, 36, 37].

3.1.2. Organizational Factors. The organizational barriers affecting nurses' political participation or policy interventions were inductively synthesized into two themes and five subthemes: "nurses' working environment constraints" (subthemes: poor working environments and time and resource constraints) and "barriers to organizational culture" (subthemes: nepotism and favoritism within the organization, hierarchical and structural organizational culture, and generation differences among nurses).

Poor working environments [10, 11, 26, 28, 31, 33, 36], as a subtheme of "nurses' working environment constraints," are a significant barrier to nurses' political participation by limiting their capacity and motivation to engage in activities beyond their immediate clinical responsibilities [10, 11, 26, 28, 31, 33, 36]. A challenging work environment characterized by high stress, shift work, long hours, insufficient staffing levels, and a lack of resources leaves nurses physically and emotionally drained, reducing their availability and energy for political advocacy or policy-making activities. Furthermore, poor working environments create time and resource constraints for nurses, which act as a barrier to political participation because it requires time, resources, and sacrifice at an individual level [10, 11, 14, 26, 28, 33, 36].

The subtheme of nepotism and favoritism within the organization under the theme "barriers to organizational culture" refers to practices within healthcare and nursing educational institutions where opportunities for involvement in policy-making are unfairly allocated based on personal relationships rather than merit, skills, or professional qualifications [26, 28, 33, 34, 36]. This creates significant barriers for nurses who seek to participate in political and policy intervention activities but find

themselves excluded or marginalized because of these biased practices. Furthermore, the hierarchical and structural organizational culture within healthcare institutions, with rigidly stratified and formal organizational structures, may impede nurses' political participation [10, 26, 28, 30, 31, 33, 36, 37]. Meanwhile, "generational differences among nurses" may act as barriers to cohesive action and participation in policy intervention due to the varying levels of interest, engagement, and methods of communication preferred by different generations [27, 28].

3.1.3. Professional Factors. The professional barriers affecting nurses' political participation or policy interventions were inductively synthesized into four themes and 10 subthemes: "stereotypes of the nursing profession" (subthemes: undervaluation of nurses' expertise and gender biases), "lack of political nursing education" (subthemes: insufficient education and training in political competence and lack of mentorship and legislative internship), "limitation of support for nurses by nursing representative organization" (subthemes: insufficient advocacy efforts for nurses, deficiency of political resources, and minimal encouragement for political participation), and "lack of political power of nursing representative organizations" (subthemes: lack of political network-building and communication skills, lack of conflict management capabilities among interest groups, interaction barriers with legislators and difficulty articulating nursing perspectives, and insufficient intervention in policy decision-making processes).

Relating to the "professional stereotypes of the nursing profession," the subtheme of undervaluation of nurses' expertise reflects a systemic issue in which nurses' knowledge and contributions are not fully valued in society or the political arena [7, 10, 14, 26, 28–30, 33, 36]. In addition, the nursing profession, historically and predominantly female, faces gender biases that further compound the issue of undervaluation [13, 26, 28, 30, 31, 33, 36, 37]. In a world where men are primarily responsible for policy-making roles, the gender limitations of women in nursing professions also negatively affect performing policy-making functions [13, 26, 28, 30, 31, 33, 36, 37].

Most nurse activists pointed out that the "lack of political nursing education" is a serious professional barriers that undermine nurses' political participation [7, 10, 11, 14, 26–30, 33, 34, 36–38]. In this regard, most nurse activists pointed out insufficient education and training in political competence [7, 10, 11, 14, 26–30, 33, 34, 36–38] and a lack of mentorship and legislative internship [7, 10, 11, 26, 28, 29, 33, 36], especially political mentorship, which is crucial for developing nurses' political skills and policy competence [28, 32, 33, 36]. Without the guidance and support of an experienced mentor, aspiring nurse activists may struggle to find a pathway to political engagement, develop the necessary confidence and skills, and navigate the challenges of policy advocacy and political participation [7, 10, 11, 26, 28, 29, 33, 36].

The subthemes of insufficient advocacy efforts for nurses [7, 28, 33, 34, 36, 37], deficiency of political resources, and

minimal encouragement for political participation [10, 28, 29, 33, 36, 37] under the theme "limitation of support for nurses by the nursing representative organizations" were also reported as professional barriers. Nurse activists pointed out that although nursing representative organizations are making efforts to improve the poor working environment of nurses and defend the public's right to health, it is still insufficient, and improvements are needed [10, 28, 29, 33, 36]. In addition, without encouragement and support for political participation from representative organizations, nurses may not perceive political participation as a professional responsibility [34].

Furthermore, most nurse activists stated the "lack of political power of nursing representative organizations [10, 11, 14, 26, 28, 33, 34, 36]." Relating to this, the specific barriers are not only a lack of political network-building and communication skills and conflict management capabilities among interest groups [10, 11, 14, 26, 28, 29, 33, 34, 36] but also interaction barriers with legislators and difficulty articulating nursing perspectives [10, 11, 14, 26, 28, 33, 34, 36] and insufficient intervention in policy decision-making processes [7, 10, 11, 14, 26, 28, 29, 31, 33, 34, 36, 37]. In particular, the lack of political network-building indicates a lack of platforms or environments that facilitate meaningful connections between nurses, policymakers, or influencers in the health policy arena [10, 11, 28, 33, 34, 36]. These limitations restrict the ability of nursing professionals to form alliances, share knowledge, and collaborate on policy initiatives, significantly reducing their influence on health policy interventions [34]. Meanwhile, nurses often encounter competition from other healthcare professionals during policy-making [11]. Therefore, interprofessional competition may manifest as a struggle for influence, recognition, and resources, making it challenging for the nursing profession to assert its interests and contributions [34]. In addition, nurse activists reported feeling excluded from decision-making processes in health policy, which could lead to difficulty in articulating nursing perspectives in policy-making.

3.2. Facilitators Factors. The seven themes were inductively synthesized as follows: personal factors (themes: recognition of social responsibilities, enhancing nurses' political competence), organizational factors (themes: innovating organizational environments), and professional factors (themes: enhancing political nursing education, promoting a supportive system by nursing representative organizations, activating nursing organizations' political activities, and enhancing nursing representative organizations' intervention in healthcare policy reform).

3.2.1. Personal Factors. The personal facilitators affecting nurses' political participation or policy interventions were inductively synthesized into two themes and five subthemes: "recognition of social responsibilities" (subthemes: awareness of healthcare problems, enhancing nursing professional values) and the "enhancing nurses' political competence" (subtheme: accumulation of political knowledge,

information, and skills, engagement in nursing representative organizations' activities, and participation in political activities or policy intervention).

The motivation for nurse activists' participation in political or healthcare policy interventions was awareness of healthcare problems affecting the public's right to health and nurses' working environments and recognition of social responsibilities to advocate for them as a nursing profession [7, 10, 11, 14, 27–38]. Therefore, increasing nurses' "recognition of social responsibilities" through awareness of healthcare problems [7, 10, 11, 14, 27–38] and enhancing nursing professional values [7, 11, 28, 30–38] are factors in encouraging a commitment to political participation or policy intervention among nurses.

Most nurse activists emphasized "enhancing nurses' political competence" [7, 11, 13, 14, 27–29, 31–36, 38]. They tried strengthening inner political power by accumulating political knowledge, information, and skills on public health problems and policy-making [7, 11, 13, 14, 27–29, 31–36, 38]. They also began to lead healthcare policy reform based on internal and external power accumulated through active political activities, that is, political competence [33, 36]. During this process, they actively participated in political activities within the nursing profession [7, 11, 13, 14, 27–29, 31–36, 38]. Therefore, it is important to enhance political competence and encourage participation in political activities or policy interventions [7, 11, 14, 27, 28, 31–38] through the accumulation of political knowledge, information, and skills [7, 11, 13, 14, 27–29, 31–36, 38] and engagement in nursing representative organization' activities [7, 11, 14, 27–29, 32–36, 38].

3.2.2. Organizational Factors. The organizational factors affecting nurses' political participation or policy interventions were inductively synthesized into one theme and two subthemes: "innovating organizational environments" (subthemes: improvement of nursing work environments and postering supportive organizational culture).

To improve poor working environments, which is one of the organizational barriers, efforts are needed to ensure adequate staffing levels, improve nursing working environments [11, 28, 33, 36], and provide adequate compensation to nurses [27, 28]. Also, by improving the job satisfaction and morale of nurses through "innovating organizational environments," nurses could be encouraged to participate more actively in political activities [10, 11, 28, 33, 36]. In addition, to overcome the limitations of organizational culture, such as favoritism, hierarchical and structured organizational culture, and generational differences, nursing organizations and healthcare institutions need to foster a culture of collaboration and inclusivity [27, 28]. Furthermore, encouraging open communication, shared decision-making, and flattening hierarchical structures are necessary for postering supportive organizational culture, which could promote active policy debate and political competence of nurses [10, 11, 28, 33, 36].

3.2.3. Professional Factors. The professional factors affecting nurses' political participation or policy interventions were inductively synthesized into four themes and 14 subthemes: "enhancing political nursing education" (subthemes: development and operation of systematic nursing political education curriculum, activating political nursing education for nurturing nursing political activists, development and operation of experiential mentoring and legislative programs, and strengthening evidence-based research for policy development), "promoting a supportive system for nurses by nursing representative organizations" (subthemes: establishing a politically supportive system for nursing activists and enhancing cohesiveness in nursing representative organizations), "activating nursing organizational political activities" (subthemes: building political networking as a source of power, persuasion using effective communication in the political arena, enhancing various political activities through developing networks, and formation of social opinion using media), and "enhancing nursing representative organizations' intervention in healthcare policy reform" (subthemes: development of healthcare policy reform alternatives, lobbying and petitioning policymakers to reflect the nursing perspective, participating in healthcare policy-making process, and implementing and ongoing monitoring of proposed policy reform legislation).

Among the professional factors promoting nurses' political participation, the most frequently stated by nurse activists was "enhancing political nursing education" [7, 11, 14, 26, 28, 29, 32–38], and they reported that education promotes nurses' professional values such as identity, vision, passion, and confidence [11, 28, 32–36, 38]. Most of them stated that they obtained political knowledge, skills, and information through work or political experience more than formal nursing education due to the lack of formal education [11, 13, 26–28, 33–37]. Accordingly, development and operation of systematic nursing political education curriculum, a variety of formal and informal education, are required for nurses [7, 11, 14, 26, 28, 29, 32–38]. In addition, the developing and operating of experiential mentoring and legislative programs are effective in activating political nursing education and nurturing nursing political activists [7, 11, 26–29, 33, 36, 38]. By providing training in political skills for nurses to improve practical interpersonal skills such as communication, persuasion, and negotiation, it could develop nurses' political competence [7, 11, 26–29, 33, 36, 38]. Furthermore, strengthening evidence-based research for policy development is critical for reflecting nursing perspectives into healthcare policies [7, 11, 13, 14, 28, 29, 32–36, 38].

Some nurse activists emphasize "promoting a supportive system by nursing representative organizations" [10, 11, 13, 14, 27, 28, 31–34, 36] through the establishment of a politically supportive system for nursing activists [10, 11, 14, 28, 31, 33, 34, 36]. In addition, to secure political opportunities for nurses, who account for most healthcare professionals, it is crucial to enhance cohesiveness in nursing representative organizations or civic organizations

[11, 13, 27, 28, 31, 33–36]. This makes it possible contributing to a unified social voice of the nursing profession [34].

Meanwhile, most nurse activists stated that building political networking as a source of power [7, 11, 13, 14, 27–29, 31–38] is most important for “activating nursing organizations’ political activities [7, 11, 13, 14, 27–29, 31–38].” Networking is a strategy that influences health policy and contributes to expanding nurses’ political participation by securing a basis for communication and support from politicians, including members of the National Assembly [11, 34]. In addition, establishing social solidarity with various patient groups, healthcare representative organizations, and municipal government organizations is effective in exercising political influence by nursing organizations’ enhancing various political activities through developing networks [7, 11, 13, 14, 28, 29, 31, 33–37]. Mainly, it is necessary to be familiar with the language and laws used by politicians and to conduct persuasion using effective communication in the political arena, such as writing, listening, presentation, and conflict resolution skills with perseverance [7, 11, 14, 28, 29, 32–36, 38]. In addition, one of the effective facilitating strategies is the formation of social opinion using media, such as letters, campaigns, parliamentary debates, public hearings, voting, securing political funds or sponsoring politicians, and lobbying [7, 11, 14, 28, 33–37].

Relating to “enhancing nursing representative organization’s intervention in healthcare policy reform [7, 11, 13, 14, 27–29, 31–38],” nurse activists sought policy intervention by identifying issues and analyzing healthcare problems, then development of healthcare policy reform alternatives [7, 11, 13, 14, 27–29, 31–36], and lobbying and petitioning policymakers to reflect the nursing perspective [7, 11, 13, 14, 28, 29, 33, 34, 36, 37]. Nurse activists emphasized that healthcare policy reform alternatives should be developed first to activate healthcare policy intervention [7, 11, 13, 14, 27–29, 31–36]. Thus, it is proactively necessary to understand issues and policy-making processes to predict current and future healthcare problems [7, 11, 13, 14, 27–29, 31–36]. Then, lobby or petition to persuade legislators, elected officials, and politicians [7, 11, 13, 14, 28, 29, 33, 34, 36, 37] and those experiences create opportunities for participating in the healthcare policy-making process as members of the government policy deliberation committee, members of parliament, and city councilors [7, 10, 11, 14, 27–29, 31–38]. This ultimately contributes to the realization of the proposed healthcare policy reform legislation reflecting the nursing perspective [11, 13, 29, 33, 34, 36]. In this process, nurses must implement and monitor the proposed policy reform legislation to properly implement the reform policies or bills without distortion in the field [11, 34].

4. Discussion

This study conducted a systematic review and meta-synthesis to analyze the barriers and factors influencing nurses’ political participation and healthcare policy intervention. Three categories, personal, organizational, and

professional, affected the barriers and factors of nurses’ political participation or policy intervention.

Among the barriers affecting nurses’ political participation or policy intervention, personal factors include their lack of political interest and political competence. The organizational barriers were reported as limitations of nurses’ work environments and barriers to organizational culture. Furthermore, professional barriers were noted, such as stereotypes of the nursing profession, a lack of political nursing education for nurses, the political power of nursing representative organizations, and the limited support for nurses from these organizations. Relating this, previous studies in political science suggest that political interest is a significant predictor and motivator of political activity [4, 42]. However, nurse activists mentioned that most nurses’ political interests were insufficient [6–9, 11, 13–15, 26–28, 33, 36, 37]. In this regard, political scientists Clore and Huntsinger [43] emphasized the importance of creating a public atmosphere because people who lack political knowledge or information generally make vague judgments that negatively affect political participation. Therefore, it is necessary to refer to research results that show a high correlation between political interest in social issues or efficacy and political participation in political science research [44–46]. Meanwhile, nurse activists pointed out the environmental factors of shift work, lack of nursing staff, and gender issues, which are consistent with previous studies suggesting heavy workload, time constraints [10, 11, 26, 28, 33, 36], and male-centered gender issues [13, 26, 28, 33, 36]. Therefore, to revitalize the participation of nurses in politics, improvements in the working environment and sexual problems must precede. Regarding the lack of participation in nursing organizations and activities due to political barriers, most nurses were not members of professional organizations, and the results coincide with those of previous research [7, 47]. Another barrier to nurses’ political participation is the lack of nursing education, which has been continuously raised in previous studies [7, 10, 11, 14, 26–30, 33, 34, 36, 38]. According to political scientists, this barrier can be addressed through political socialization, the process of learning, and internalizing the political culture, knowledge, and value attitudes of an individual society [48].

The factors affecting nurses’ political participation and policy interventions as personal factors were recognizing social responsibilities and enhancing political competence. In addition, professional factors such as enhancing political nursing education, promoting support systems for nurses by nursing representative organizations, activating nursing organizational and political activities, and enhancing nursing representative organizations’ interventions in healthcare policy reforms were noted. Nurse activists began their political activities when they recognized the social responsibility of the nursing profession, which coincided with that presented in previous studies as professional nursing responsibilities [6, 8, 9, 15]. In this regard, Cohen et al. [49] suggested buy-in, self-interest, political sophistication, and leading role as the stages of nursing professionals’ political participation. Among them, the

perception of political activism was emphasized to achieve the purpose of the nursing profession in the first stage of political participation [49], consistent with the results of this meta-analysis, which recognized healthcare problems and social responsibility as most nurse activists began their activities.

In addition, factors of political participation or policy intervention included promoting awareness of nursing profession values, acquiring political knowledge and information, training political skills by enhancing nursing education, strengthening cohesiveness in professional organizations, building political networking, effective communication, and collaboration, and participating in various political activities to enhance nurses' political competence. First, reinforcing the value for nursing professionals derived from the synthesis of factors promoting political participation refers to nursing identity, confidence, and social advocacy responsibility. Almond and Verba [50], political scholars who first proposed the concept of political competence in political science, related it to personal political competence, political efficacy, objective political competence, and political self-confidence. It may be necessary to prepare measures to improve expectations, attitudes, and confidence in politics that increase political efficacy [50]. More importantly, nurses' pride in the nursing profession must be high to realize their social responsibility and provide opportunities to actively participate in politics actively [9]. Therefore, the development and operation of formal or nonregular curricula, mentoring, and internships at universities or nursing organizations are essential to strengthen attitudes as nursing professionals, political knowledge, and technical education through political socialization.

Meanwhile, nurse political activists not only built political knowledge, information, and political skills such as networking but also actively performed various social solidarity activities and media use [7, 11, 13, 14, 27–29, 31–38]. Like this, strengthening political competence is crucial to activate nurses' political participation and policy intervention. The concept of nurses' political competence, which was derived as a factor that facilitates nurses' political participation, was developed by Han and Kim [9] in 2020 by integrating the concepts presented in previous nursing studies and political science with nurse political activists' interview during the fieldwork phase and categorized into political knowledge, political efficacy, political interaction, and political activity. Previous studies in political science have reported that political competence acts as a motivation or attitude variable and affects the degree of political participation depending on the level of competence [3, 4, 50]. Therefore, since nurses' political participation is possible when the level of political competence is high [9], it is necessary to maximize political influence by improving political competence based on nursing representative organization-centered solidarity [9]. Furthermore, the process through which nurse activists lead policy reform by developing healthcare policy alternatives is consistent with the leading role stage suggested by Cohen et al. [49]. Through these steps, nurses' political competence was strengthened, reflecting the views of the nursing profession

when enacting laws or policies on national health and enabling them to advocate for public health rights [42]. Finally, strategies for activating policy intervention and developing policy reform alternatives should be prioritized by conducting healthcare policy analyses and research based on an understanding of healthcare problems and policy decision-making processes. Activation of policy intervention refers to the reinforcement of policy competencies, consistent with Arabi et al. [51], suggesting policy awareness, nurse power, and advocacy of the nursing profession as attributes of the concept of policy impact. This is also consistent with previous studies showing that nurses used academic preparation for policy development for policy interventions, evidence-based research ability to influence policy decision-making based on awareness of health policy issues and understanding of legislative policy processes [26]. Therefore, nurses should activate entry into the political arena by resolving barriers to political participation based on the lessons learned from nurse activists' political experiences and by strengthening their political and policy competencies to advocate for the public and improve the working environment. Through these, the nursing profession can expand its political influence beyond traditional stereotypes.

This study minimized the omission of research results because it analyzed all papers related to the subject of this study without the limitations of language or publication period. Researchers with extensive experience in qualitative research and healthcare policy interventions conducted sufficient discussions throughout the process, from article selection to analysis, in order to ensure the validity and accuracy of the research results. The limitations of this study are the results of a qualitative meta-synthesis that analyzed the experiences of nurses with different personal backgrounds and in some countries with different political and cultural environments; therefore, the study results cannot be generalized. In addition, the risk of selection bias was not entirely excluded by analyzing the participants without considering environmental conditions such as political activity and policy intervention experiences, roles, and workplaces. Some studies included in the analysis did not meet the methodological quality evaluation criteria, and there is a limitation in the analysis based on papers published in a journal rather than receiving and analyzing original data from the authors of the study.

5. Conclusions

This study conducted a systematic review and qualitative meta-synthesis of existing research results to comprehensively analyze the barriers and factors influencing nurses' political participation or healthcare policy intervention. The research results synthesized the barriers and factors of political participation or healthcare policy intervention into three categories: personal, organizational, and professional factors, with eight themes and 22 subthemes for barriers, and seven themes and 21 subthemes for facilitators.

The barriers to political participation or policy intervention of nurses were composed of themes, personal factors (lack of political interest of nurses and lack of

political competence of nurses), organizational factors (themes: limitations of the work environments of nurses and barriers to organizational culture), and professional factors (themes: stereotypes of the nursing profession, lack of political nursing education, limitation of support for nurses by nursing representative organizations, and lack of political power of nursing representative organizations). Factors of political participation were composed of themes, personal factors (themes: recognition of social responsibilities and enhancing political competence), organizational factors (themes: innovating organizational environments), professional factors (themes: enhancing political nursing education, promoting a supportive system by nursing representative organizations, activating nursing organizational political activities, and enhancing nursing representative organizations' intervention in healthcare policy reform).

This study can be used as main data for enhancing nurses' political participation, policy interventions, and preparation strategies. The study is significant in where most of the participants in this study have experienced as nurse political activists; there is no previous study on the experience of general nurses' political participation to develop a more detailed strategy for activating political participation in the future. There are some studies on the effects of education, despite the lack of nursing education. However, research on the development of nursing programs is necessary because there are few studies on the development of nursing education. Furthermore, development studies measuring nurses' political competence and theories of strengthening nurses' political competence are needed [45].

6. Implications for Nursing Management

Nurses' political participation is required to optimize the quality and equity of health services provided to patients and to improve their working environments [12, 30]. Based on the growth process as a nursing political activist synthesized in this study, the barriers to and facilitating factors for nurses' political participation, and the concept of activating policy interventions, a theory for strengthening nurses' political competencies can be developed. To activate nurses' political participation, nursing organization leaders in practice and in various nursing fields must refer to this study. Through this, nurses can improve their working environment, increase their interest in politics, share political information and knowledge, join the nursing representative organization, and encourage participation in various political activities. Furthermore, instructors in nursing education should organize curricula, develop programs, and systematically implement them to strengthen political nursing education. Finally, based on the results of this study, nursing representative organizations can prepare a strategy for activating nurses' political participation, provide them with opportunities to engage in political activities and policy interventions, and promote the revitalization of politicians.

Data Availability

The data used to support the findings of this study are available from the first author upon reasonable request.

Ethical Approval

The study used secondary data and did not require ethical approval.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Nam Kyung Han conceptualized and visualized this study, performed formal analysis and data curation, wrote the original draft, and reviewed and edited the manuscript. Gwang Suk Kim conceptualized the study, performed formal analysis and data curation, wrote the original draft, and reviewed and edited the manuscript. The authors are the only contributors to this study.

Supplementary Materials

Supplementary Materials include seven files that provide further information about search strategies, excluded articles based on the full-text review, the PRISMA 2020 checklist, a list of the selected articles for analysis, the findings (barriers and facilitators), the GRADE CERQual assessment, and the eMERGEe reporting result. (*Supplementary Materials*)

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Research Article

Challenge-Oriented Organizational Citizenship Behaviors among Nurses: The Influence of Perceived Inclusive Leadership and Organizational Justice in High-Intensity Work Environment

Zhen Li ^{1,2}, Kefan Chen ³, Qing Meng ³, Zhaoli Meng ^{1,2}, Yu Zhao ^{1,2}
and Dehui Li ⁴

¹Department of Otorhinolaryngology-Head & Neck Surgery, West China Hospital of Sichuan University, Chengdu, China

²Department of Audiology and Speech Language Pathology, West China Hospital of Sichuan University, Chengdu, China

³West China School of Nursing, Sichuan University, Chengdu, China

⁴Department of Strategic and Human Resource Management, Business School, Sichuan University, Chengdu, China

Correspondence should be addressed to Dehui Li; ldehui@foxmail.com

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Aims. This study was designed to investigate the impact of inclusive leadership on challenge-oriented citizenship behaviors and examine the mediating role of organizational justice on the relationship between inclusive leadership and challenge-oriented citizenship behaviors among nurses. **Background.** Leaders exhibiting an inclusive leadership style have the potential to create a positive work climate and motivate members of the organization. However, the mechanisms by which organizational justice contributes to this process remain to be explored, particularly in terms of how it motivates challenge-oriented organizational citizenship behaviors. **Method.** A cross-sectional questionnaire survey was conducted among nurses in China at the end period of the COVID-19 pandemic. A total of 527 registered nurses were enrolled and completed the self-report questionnaires including inclusive leadership scale, organizational justice scale, and challenge-oriented citizenship behavior scale. The hypotheses were tested using hierarchical multiple regression analyses and structural equation modelling. **Results.** The results of empirical tests revealed that nurse leader's inclusive leadership had a positive relationship on nurses' challenge-oriented organizational citizenship behaviors ($\beta = 0.823$, $p < 0.001$) after controlling several demographic covariates. Meanwhile, inclusive leadership was positively linked to organizational justice ($\beta = 0.747$, $p < 0.001$), and the indirect effect of inclusive leadership on nurses' challenge-oriented citizenship behaviors through organizational justice was statistically significant ($\beta = 0.641$, $p < 0.001$). Furthermore, the model fit indices were $\chi^2/df = 1.952$, RMSEA = 0.043, CFI = 0.979, and TLI = 0.977, indicating that the model had high quality. **Conclusion.** This study could help nurse leaders with inclusive leadership style have a better understanding and taking the advantages of the influence mechanism of organizational justice in inspiring nurses' challenge-oriented citizenship behaviors. While nurse managers can inspire challenge-oriented organizational citizenship behaviors through inclusive leadership, they should also emphasize the evaluative and behavioral-shaping effects of organizational justice. Both leadership and organizational justice are essential to motivate challenge-oriented organizational citizenship behaviors and to foster organizational development. Moreover, managers should focus on the process and conditions of implementing organizational justice to ensure fairness within the organization and to create a conducive environment for challenge-oriented organizational citizenship behaviors.

1. Introduction

Nurses operate within high-pressure and high-intensity environments, commonly encountering unpredictable circumstances which necessitate effective responses to challenges [1]. Apart from possessing seasoned professional

expertise and exceptional clinical skills, nurses also require competent team leadership and organizational support [2]. For instance, during the COVID-19 pandemic, nurses had to carry out extensive medical and public health tasks requiring them to address issues related to complex and stressful circumstances [3], communication [4], work pressure [5],

psychological stress [6], and burnout [7]. Consequently, they must frequently restructure and refine their professional skills, working procedures, and management systems, while undertaking extrarole behaviors [8].

Inclusive leadership is often emphasized to motivate nurses to make a greater contribution at work and achieve their full potential. Nonetheless, the practical challenge lies in the complexity of nursing work, which necessitates responses to patient and public health needs based on factors such as the nurse's ability level, patient physical state, and the operational status of the healthcare institution. As a result, the nurse's work is frequently challenging to delimit precisely, and expectations regarding their performance are frequently high. Social exchange theory posits that an individual's behavior is influenced by their perception of justice [9]. In uncertain work environments, nurses possess the drive and demand to exhibit organizational citizenship behaviors; however, this does not necessarily lead to the occurrence of such behaviors, particularly when they are not explicitly defined in formal work duties and can introduce changes and challenges to existing organizational work procedures. This can also lead to relational conflict [10], underscoring the necessity for challenge-oriented organizational citizenship behaviors to have corresponding requirements for the organization's leadership style and atmosphere.

While the interest in inclusive leadership continues to gain traction among scholars, current research predominantly focuses on nurses as research subject to explore the role of inclusive leadership in promoting nurses' psychological perception and behavioral abilities [8]. The inclusive practices of leaders are not only instrumental in shaping employees' personal and group experiences but also the inclusiveness requirements and strategies of an organization [11]. Therefore, the occurrence of certain behavior must be contextualized. Furthermore, the conditions and processes that determine the effectiveness of inclusive leadership, and the factors that facilitate or hinder its role, require extensive exploration and elucidation.

To bridge the research gap, this study intends to investigate the relationship between inclusive leadership and challenge-oriented organizational citizenship behaviors among nurses. Drawing upon the social exchange theory [12], we argue that inclusive leadership facilitates nurses' perception of organizational justice [13], which leads them to feel that they are being treated fairly, whether it is tangible or intangible and consequently enhances their morale, work motivation, loyalty, and stability. Moreover, organizational justice plays a mediating role in stimulating positive challenge-oriented organizational citizenship behaviors while reducing the potential conflicts caused by such behaviors.

2. Theory and Hypotheses

2.1. Inclusive Leadership. The concept of inclusive leadership was first described by Nembhard and Edmondson [14] as "words and deeds by a leader or leaders that indicate an

invitation and appreciation for others' contribution." Carmeli et al. [15] further defined it as the core of relational leadership, a leadership style that exhibits openness, availability, and accessibility in interactions with subordinates. Inclusive leadership implies that leaders not only exhibit the characteristics of recognizing employee's differences [16], collaborating during decision-making [17], promoting creativity through cognitive mechanism [18], and cultivating the ability of the employee to learn and work as a catalyst for the achievement of organizational goals [19] but also means that the entire organizational team is concerned about new opportunities [20], prepares for organizational change [21], and supports for organizational structure and culture [22], thus having a tremendous impact on the creative process of the organization [15, 23].

2.2. Inclusive Leadership and Challenge-Oriented Citizenship Behaviors. Challenge-oriented organizational citizenship behaviors are a kind of extrarole behaviors [24]. It refers to the active and intentional participation of individuals in organizational development and performance improvement, by putting forward creative ideas or encouraging change efforts related to working methods, policies, and processes in promotive forms [25]. Meanwhile, it is also a kind of proorganizational behavior "that can neither be enforced on the basis of formal role obligations nor elicited by contractual guarantees of recompense" [26, 27].

Interestingly, challenge-oriented organizational citizenship behaviors have a double-edged sword effect. On the one hand, challenge-oriented behaviors may undermine task performance and relationships with team colleagues because these suggestions require changes to the status quo, yet change means that people affected by these changes have to adapt to something new and often involve setbacks and failure [28]. On the other hand, the most prominent form of facilitation of challenge-oriented citizenship behaviors is employee voice, which is characterized by constructive suggestions for the benefit of the organization [26, 29].

Inclusive leadership may have positive impact on challenge-oriented organizational citizenship behaviors in three ways. First, inclusive leadership provides space and emotional ties to challenge-oriented organizational citizenship behaviors [30, 31]. The supportive behaviors of inclusive leaders result in employees feeling that they are treated well and with respect, which motivates the receiving party attempts to reciprocate with something equally valuable [32]. Second, inclusive leadership provides positive guidance for challenge-oriented organizational citizenship behaviors, thus avoiding the risk of the prohibitive forms of challenge-oriented behaviors in damaging relationships with others [25, 33]. The effective behaviors of inclusive leadership are conducive to resolving the negative impact of relationship conflicts [34]. Finally, when employees observe that leaders have characteristics of inclusive leadership, they are more inclined to express their concerns and voices to the leader, and communication with good response and reciprocity further strengthens the possibilities of trust-building and problem-solving [35], which makes inclusive leadership

as a precondition to challenge-oriented organizational citizenship behaviors. Based on this reasoning, we propose the following hypothesis:

H1. Inclusive leadership of nurse managers has a positive effect on nurses' challenge-oriented citizenship behaviors.

2.3. The Mediating Role of Organizational Justice. Organizational justice is based on Equity Theory [36] and can be used to describe and explain employees' perceptions of fairness and honesty of the treatment they received [13], including procedural justice, distributive justice, and interactional justice. First, procedural justice refers to the fairness of rules and procedures and is fostered "when authorities provide employees with input into key decisions and when authorities utilize procedures that are consistent, accurate, unbiased, correctable, representative of group concerns, and ethical" [37]. Second, distributive justice refers to the perceived fairness of the outcomes that individuals receive from organizations and is fostered when outcomes conform to implicit distributive norms, such as equity or equality [38]. Third, interactional justice refers to the individuals' perception and judgment on the quality of interpersonal treatment received during the execution of a procedure [39], including informational justice (the provision of adequate information and social accounts) and interpersonal justice (the dignity and respect that one receives) [40, 41].

Inclusive leadership has an impact on challenge-oriented organizational citizenship behaviors via organizational justice. First, the open and supportive behaviors of inclusive leaders can improve procedural justice in organizations, as employees have the perception that their voices are heard by managers and that they are included in the decision-making process [42]. In terms of procedural justice, the involvement of team members in the decision-making process is of great significance, which determines and achieves an organizational decision-making process that is consistent, accurate, unbiased, correctable, and ethical [37]. At the same time, it shapes member's assessment of the authority's trustworthiness [43] and reflects employees' concerns about the evaluation of procedural justice and the participation in challenge-oriented organizational citizenship behaviors [44]. Second, the perceived organizational justice makes employees feel trust in the process and distribution of outcomes of their work and therefore inspires their extrarole behaviors that contribute to effective organizational functioning [43]. In particular when employees feel that the distribution of rewards based on their work input is fair, that the process of allocating resources and rewards is transparent, and that they are treated with mutual respect, these feelings create a sense of obligation to give back to the organization [45]. Third, under inclusive leadership, employees tend to feel respected, which indicates an increased level of interactional justice in the organization [46]. The open behaviors in discussing with employees reinforce the perception of interactional justice, as employees are more likely to feel that they have received all the necessary

information and that well-developed interpersonal justice allows them not to be disturbed by interpersonal relationships, which in turn motivates them to change organizational rules or policies that are nonproductive or counterproductive, which also makes it possible to mitigate the potential conflicts in challenge-oriented organizational citizenship behaviors and stimulate positive effects. In recent years, studies on healthcare teams have revealed that organizational justice has effects on work engagement and nursing care quality [47], reducing turnover intention [48], and motivating the performance and productivity of nurses [49]. Therefore, we argue that inclusive leadership has a positive contribution to the perception of organizational justice, and meanwhile, organizational justice is a connecting mechanism in the relationship between inclusive leadership and challenge-oriented citizenship behaviors. Thus, the following hypotheses were developed:

H2. Inclusive leadership of nurse managers has a positive effect on organizational justice

H3. Organizational justice mediates the relationship between inclusive leadership of nurse managers and nurses' challenge-oriented citizenship behaviors

3. Methods

3.1. Research Design and Participants. We conducted a cross-sectional survey to examine the relationship between inclusive leadership and challenge-oriented citizenship behaviors and the moderating role of organizational justice among nurses in China at the end period of the COVID-19 pandemic. The study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. Convenient sampling was used to recruit the nurses who were registered full-time nurses and had more than six months of tenure in their current hospital and were willing to participate in this study. The minimum sample size was estimated by the maximum one of following two methods [50, 51]: (1) using PASS (Version 20.0, <https://www.ncss.com/software/pass>) with 90% power, alpha of 0.05, a medium f^2 effect size of 0.15 and 34 predictors, and assuming an attrition rate of 20%, 303 samples were estimated; (2) multiplying the number of items of the instruments by ten with assuming an attrition rate of 20%, $(9 + 20 + 5) \times 10 \times (1 + 20\%) = 408$ samples were estimated. In general, a sample size of approximately more than 400 would provide sufficient support for this study.

3.2. Instruments

3.2.1. Inclusive Leadership Scale. The inclusive leadership scale was used to measure the nurse manager's inclusive leadership style [15]. The scale consists of nine items based on three dimensions including openness (three items), availability (four items), and accessibility (two items). A sample item is, "The manager is open to discuss the desired goals and new ways to achieve them." Each item is scored on a 7-point Likert scale, ranking from one (strongly disagree) to seven (strongly agree). A total inclusive leadership score

was obtained by averaging the three dimensions, where the higher score indicated a higher level of nurses' perception of their leader's inclusive leadership.

3.2.2. Organizational Justice Scale. The organizational justice at work among nurses was measured using the scale developed by Colquitt [40]. It consists of twenty items divided into four subscales: procedural justice, distributive justice, interpersonal justice, and informational justice. The first subscale is procedural justice, with 7-item statements that ask nurses to consider the procedures their supervisor uses to make decisions about evaluations, promotions, and rewards. The second subscale, distributive justice, has 4-item statements that ask nurses to consider how they were treated by their supervisor during the implementation of procedures. The third subscale is interpersonal justice, with 4-item statements that ask nurses to consider the outcomes they received from their supervisor, including their evaluations, promotions, and rewards. Finally, the fourth subscale is informational justice, with 5-item statements that ask nurses to consider their perceived adequacy of explanations from their supervisor during the implementation of procedures. The items are scored on a 7-point Likert scale ranging from one (strongly disagree) to seven (strongly agree), with the items being answered based on how often the nurses encounter each statement. The total score was created from the average of all items, with higher scores representative of greater organizational justice.

3.2.3. Challenge-Oriented Organizational Citizenship Behaviors Scale. A 5-item measure validated by Mackenzie et al. [25] was used to measure challenge-oriented citizenship behaviors, which was drawn from the original scale developed by Van Dyne and LePine [24]. Each item is scored on a 7-point Likert scale, ranking from one (strongly disagree) to seven (strongly agree). A total challenge-oriented citizenship behaviors score was obtained by averaging all items, where the higher score indicated a higher level of nurses' challenge-oriented citizenship behaviors.

3.3. Data Collection. For the convenience of the participants and to expand the scope of the survey, the questionnaire of this study was conducted both offline and online. In the offline survey, printed questionnaires were sent to participants by the authors and recorded into the database after the questionnaires were completed. The online questionnaire was set up using a widely used electronic questionnaire collection platform named Questionnaire Star (<https://www.wjx.cn>). The internet link to the electronic questionnaire was first sent through the authors to nurses in different cities and hospitals, and they were invited to continue sharing the questionnaire with nurses in other regions and hospitals they knew. A cash coupon of RMB 5 for each offline participant and a random electronic cash coupon of RMB 5 to RMB 10 for each online participant were provided in this study, which was implemented through the Questionnaire Star platform. In order to ensure the quality of the

questionnaire design and responses, on the one hand, we designed reverse repetition questions in the questionnaire to check whether the participants answered the questionnaire carefully. On the other hand, we invited 30 nurses to conduct a pilot study for evaluating the clarity and time needed to fill out the questionnaires. The questionnaire took approximately 8–15 minutes to complete, and with reference to the previous literature [52], we removed the samples with response time less than 3 minutes and no variation in all response items; for example, all items were selected as "strongly disagree." The survey was available from October 10, 2022, to February 10, 2023, and 527 valid questionnaires were obtained for this study.

3.4. Analysis. Statistical analyses were conducted using IBM SPSS (Version 26) and AMOS (Version 26). Descriptive statistics, which included frequency and proportions, were employed to summarize the demographic characteristics of age, gender, education, marital status, years of experience in nursing, job title, and the experience in frontline work against COVID-19 in the past three years.

Hierarchical multiple regression analysis was performed to estimate the direct effect of inclusive leadership on challenge-oriented citizenship behaviors after controlling other variables. Structural equation modelling (SEM) with multiple indices criteria was conducted to determine the influence of inclusive leadership and organizational justice on challenge-oriented citizenship behaviors. In addition, to evaluate the measurement and factor structure of the study variables, confirmatory factor analysis (CFA), including KMO, Bartlett test of sphericity, and the average variance extracted (AVE) were performed to ensure the validity of the study construct, and Cronbach's alpha and composite reliability (CR) were estimated to ensure the reliability of the items of the scale used in this study [51, 53, 54].

3.5. Ethical Considerations. After scrutinizing all the necessary documents, including design of this research, written questionnaire, academic review opinions, subject informed consent, researchers' biographies, and description of source of foundations, the Biomedical Ethics Committee of the West China School of Medicine and the West China Hospital of Sichuan University granted permission to conduct this study (#2022-1479; approved on 9 September 2022). The first page of the questionnaire stated the purpose of the study, while emphasizing the voluntariness, anonymity, and confidentiality of the answers, and the participants began to answer the questionnaire survey after agreeing to the above contents.

4. Results

4.1. Demographic Profile of Participants. It can be seen in Table 1 that predominant participants had age between 26 and 40 years (59.8%), were female (85.39%), had a bachelor's degree (65.84%), and had married (71.35%). From the distribution characteristics of the participants, their years of work experience were relatively evenly distributed, ranging

TABLE 1: Demographic profile of the participants ($n = 527$).

Characteristics	Frequency (f)	Percentage (%)
<i>Age (years)</i>		
18–25	124	23.53
26–30	113	21.44
31–40	202	38.33
>40	88	16.70
<i>Gender</i>		
Female	450	85.39
Male	76	14.42
Non-disclosure	1	0.19
<i>Education</i>		
Diploma or lower	132	25.05
Bachelor	347	65.84
Master	38	7.21
PhD	10	1.90
<i>Marital status</i>		
Unmarried	144	27.32
Married	376	71.35
Divorced or other	7	1.33
<i>Years of experience</i>		
1–5 years	134	25.43
6–10 years	133	25.24
11–15 years	127	24.10
More than 15 years	133	25.24
<i>Job title</i>		
Nurse and senior nurse	459	87.10
Leader of nurse team	58	11.01
Nurse supervisor or above	10	1.90
<i>Frontline nurses in COVID-19</i>		
Yes	293	55.60
No	234	44.40

from 24.10% to 25.43% in the four levels classified in this study. In terms of the participants' job titles, 87.10% of the participants were nurse or senior nurse, 11.01% were leader of nurse team, and 1.90% of the participants were nurse supervisor or above, and these distribution characteristics were consistent with our estimation of the overall pyramid structure. In addition, more than half of the participants (55.60%) were involved in frontline work against COVID-19 in the past three years.

4.2. Reliability and Validity. Construct reliability was analyzed, Cronbach's alpha and CR, to verify the internal consistency of the instruments in the study (Table 2). Cronbach's alpha should be preferably over the recommended level of 0.7. In our study, Cronbach's alpha values ranged from 0.911 to 0.948 for all first-order scales, showing a high degree of internal consistency within the scales. In addition, the CR values exceeded the recommended level of 0.7 for all dimensions in our study scales, indicating a high degree of convergence and internal consistency [51].

Meanwhile, construct validity was verified the degree to which the instrument accurately represents the concept is defined in the study. First, the Kaiser–Meyer–Olkin (KMO) test and Bartlett test of sphericity were used to examine sampling adequacy. The KMO value should be at least 0.60, and the Bartlett test of sphericity should be statistically

significant at $p < 0.05$. The results revealed that the KMO and Bartlett test of sphericity values were 0.965 ($p < 0.001$) for the inclusive leadership scale, 0.968 ($p < 0.001$) for the organizational justice scale, and 0.913 ($p < 0.001$) for the scale of the challenge-oriented citizenship behaviors. Second, the factor loading of all constructs employed in this study exceeds the threshold value of 0.7, indicating a high degree of correspondence between the variable and the factor. Furthermore, the average variance extracted (AVE) values were higher than 0.50 thresholds for all dimensions of the study variables, indicating that the convergent validity is well-supported.

4.3. Hypothesis Test Results. Table 3 presents the results of the hierarchical multiple regression analysis to test the effect of inclusive leadership on nurses' challenge-oriented citizenship behaviors. After controlling the demographic variables in Model 1 (age, gender, educational background, marital status, years of experience, job position, and the work experience in COVID-19) as covariates, the inclusive leadership statistically significantly enhances nurses' challenge-oriented citizenship behaviors ($\beta = 0.823$, $p < 0.001$) in Model 2, with 50.6% increasing of adjusted R^2 . Thus, H1 was supported.

Table 4 and Figure 1 illustrate that inclusive leadership was positively associated with organizational justice ($\beta = 0.858$, $p < 0.001$), which supported H2, and organizational justice was positively associated with nurses' challenge-oriented citizenship behaviors ($\beta = 0.747$, $p < 0.001$). In addition, after incorporating organizational justice into the model, the direct effect of inclusive leadership on nurses' challenge-oriented citizenship behaviors was no longer statistically significant ($\beta = 0.075$, $p > 0.05$). In the bootstrap test with AMOS (Version 26), the results of 5000 bootstrapping resamples revealed that the estimated coefficient of the indirect effect of inclusive leadership on nurses' challenge-oriented citizenship behaviors was statistically significant ($\beta = 0.641$, $p < 0.001$). In sum, these empirical results indicated that organizational justice acts as a mediator in the relationship between inclusive leadership and nurses' challenge-oriented citizenship behaviors. Furthermore, the model fit indices were $\chi^2/df = 1.952$, RMSEA = 0.043, CFI = 0.979, and TLI = 0.977, indicating that the model had high quality. Thus, H3 was supported.

5. Discussion

Nurses operate in demanding and intense work environments where the leadership style demonstrated by leaders is considered crucial in facilitating effective nursing practices. In our research, we argue that inclusive leadership does not automatically result in challenge-oriented organizational citizenship behaviors, particularly those that lack clear definition within formal job responsibilities and tend to disrupt and question existing organizational practices. By integrating social exchange theory [12] and organizational justice theory [13] into our investigation, we have discovered that inclusive leadership positively influences nurses'

TABLE 2: Test results of reliability and validity.

Scale	No. of items	Mean (SD)	KMO	Bartlett test	Loading range	α	CR	AVE
Inclusive leadership	9	5.20 (1.59)	0.965	<0.001	0.873–0.926			
Openness	3	5.22 (1.61)	0.760	<0.001		0.917	0.918	0.789
Availability	4	5.17 (1.58)	0.866	<0.001		0.947	0.948	0.820
Accessibility	2	5.24 (1.61)	0.500	<0.001		0.911	0.911	0.837
Organizational justice	20	5.25 (1.55)	0.968	<0.001	0.742–0.935			
Procedural justice	7	5.15 (1.53)	0.946	<0.001		0.948	0.948	0.724
Distributive justice	4	5.32 (1.55)	0.859	<0.001		0.943	0.944	0.808
Interpersonal justice	4	5.34 (1.59)	0.870	<0.001		0.944	0.844	0.810
Informational justice	5	5.25 (1.54)	0.915	<0.001		0.947	0.948	0.784
Challenge-oriented citizenship behaviors	5	5.26 (1.45)	0.913	<0.001	0.809–0.919	0.943	0.943	0.768

SD, standard deviation; CR, composite reliability; AVE, average variance extracted. The rows with regular font values are the first order and the bold values represent the second order for inclusive leadership and organizational justice.

TABLE 3: Multiple linear regression analysis of inclusive leadership on challenge-oriented citizenship behaviors.

Variables	Challenge-oriented citizenship behaviors							
	Model 1				Model 2			
	β	Std. err	<i>t</i>	<i>p</i>	β	Std. err	<i>t</i>	<i>p</i>
Main effect variables								
Inclusive leadership					0.823	0.030	27.46	<0.001
Control variables								
Age (years)								
18–25	–1.344	0.425	–3.17	0.002	–0.269	0.273	–0.98	0.325
26–30	–0.879	0.378	–2.33	0.020	–0.180	0.242	–0.75	0.456
31–40	–0.349	0.284	–1.23	0.219	0.108	0.181	0.60	0.550
>40	(omitted)				(omitted)			
Gender								
Female	0.881	0.202	4.36	<0.001	0.189	0.131	1.44	0.150
Male	(omitted)				(omitted)			
Education								
Diploma or lower	–0.521	0.494	–1.05	0.292	–0.400	0.314	–1.27	0.203
Bachelor	–0.253	0.477	–0.53	0.596	–0.242	0.303	–0.80	0.425
Master	0.726	0.532	1.37	0.173	0.380	0.339	1.12	0.262
PhD	(omitted)				(omitted)			
Marital status								
Unmarried	–0.260	0.595	–0.44	0.663	0.202	0.378	0.53	0.593
Married	0.185	0.624	0.30	0.767	0.676	0.397	1.70	0.089
Divorced or other	(omitted)				(omitted)			
Years of experience								
1–5 years	0.603	0.395	1.53	0.127	–0.239	0.253	–0.94	0.346
6–10 years	–0.445	0.318	–1.40	0.163	–0.329	0.202	–1.63	0.104
11–15 years	–0.525	0.265	–1.98	0.049	–0.486	0.169	–2.88	0.004
More than 15 years	(omitted)				(omitted)			
Job title								
Nurse and senior nurse	–0.779	0.480	–1.62	0.105	–0.520	0.305	–1.70	0.089
Leader of nurse team	–0.576	0.515	–1.12	0.264	–0.785	0.328	–2.40	0.017
Nurse supervisor or above					(omitted)			
Frontline in COVID-19								
Yes	0.191	0.134	1.43	0.154	0.038	0.085	0.45	0.653
No	(omitted)				(omitted)			
_cons	7.323	0.900	8.14	<0.001	2.638	0.597	4.42	<0.001
Adjusted R^2	0.150				0.657			
ΔR^2					0.506			

inclination towards engaging in challenge-oriented organizational citizenship behaviors, with organizational justice serving as a mediating mechanism.

This paper contributes theoretically and practically in several ways. First, previous research has highlighted the

crucial role of effective managerial support in fostering organizational citizenship behaviors. Team members can assess their level of engagement in such behaviors by observing the conduct of inclusive leaders. Inclusive leaders who exhibit supportive and helpful behaviors, such as being

TABLE 4: Mediation effect of organizational justice between inclusive leadership and challenge-oriented citizenship behaviors.

Structural path	β	Std. err	t	p	95% conf. interval	
					Lower	Upper
<i>Direct effect</i>						
Inclusive leadership \rightarrow organizational justice	0.858	0.032	26.813	<0.001	0.793	0.920
Organizational justice \rightarrow challenge-oriented citizenship behaviors	0.747	0.148	5.047	<0.001	0.456	1.034
Inclusive leadership \rightarrow challenge-oriented citizenship behaviors	0.075	0.131	0.573	0.560	-0.172	0.340
<i>Indirect effect</i>						
Inclusive leadership \rightarrow challenge-oriented citizenship behaviors	0.641	0.123	5.211	<0.001	0.397	0.878
<i>Total effect</i>						
Inclusive leadership \rightarrow challenge-oriented citizenship behaviors	0.715	0.034	21.03	<0.001	0.644	0.780

Note. Estimate based on 5000 bootstrap resamples.

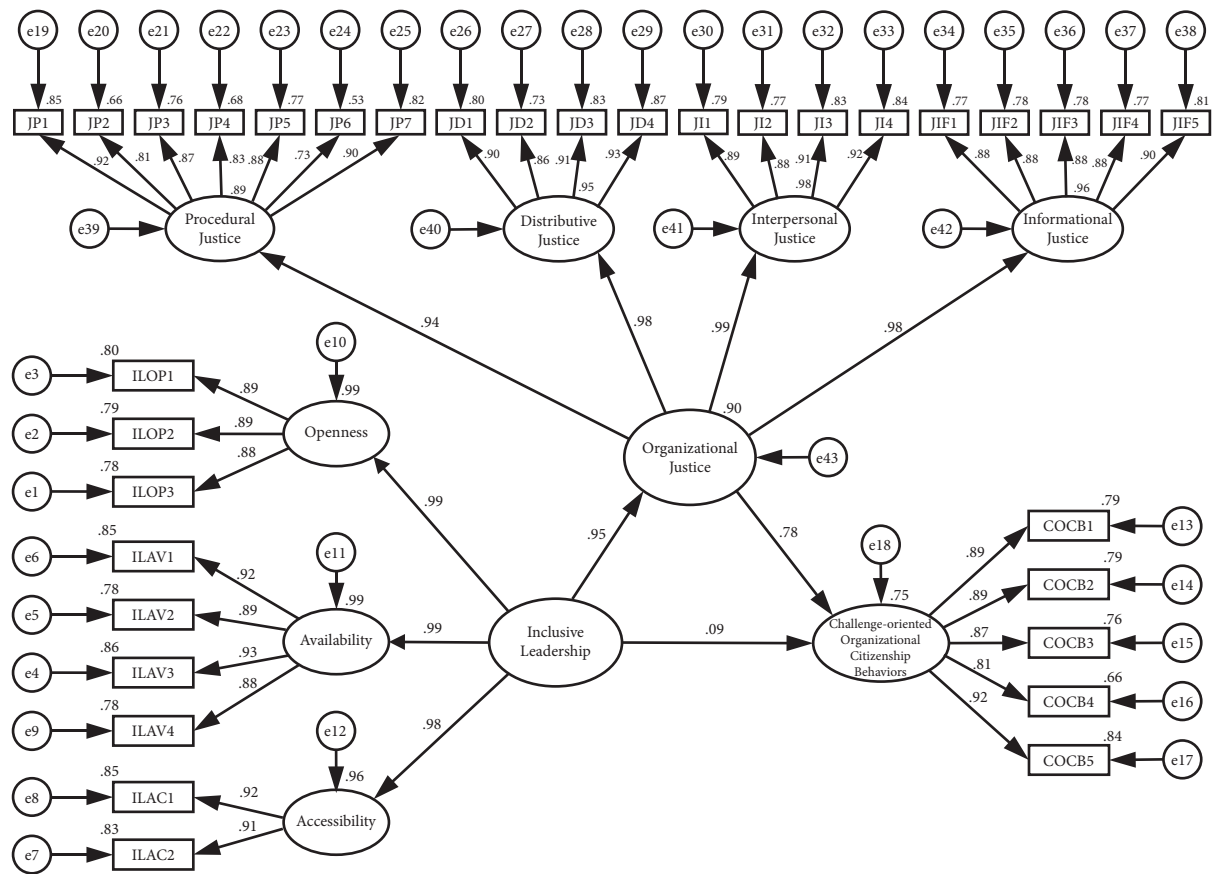


FIGURE 1: Structural equation model results.

readily available to assist others, are perceived as trustworthy by team members. As a result, team members are more likely to exhibit extrarole behaviors towards their colleagues. The supportive behaviors of inclusive leaders contribute to the development of trust among team members. When inclusive leaders demonstrate tolerance towards suggestions and mistakes, they create an open and autonomous organizational environment that encourages active employee participation, proposal of solutions, and surpassing of organizational goals. However, previous research has largely overlooked the significance of procedural safeguards and incentives, particularly in challenging work environments like nursing. In other words, although a manager's

leadership style may mitigate the negative effects of job-related friction and conflict, it does not guarantee the occurrence of positive extrarole behaviors among team members. Our research emphasizes that, drawing from social exchange theory, the supportive behavior of inclusive leaders fosters a perception among nurses that they are treated favorably, thereby motivating them to reciprocate towards the leader and the organization. Simultaneously, based on the establishment of organizational justice, this process provides safeguards for the behavior of organizational members and offers incentives for compatibility.

Second, organizational justice plays a crucial role as a motivator and mediator in this process. Existing literature

has highlighted that when employees perceive fairness from their supervisors or the organization, they are more likely to engage in organizational citizenship behaviors. In our study, we argue that organizational justice influences challenge-oriented organizational citizenship behaviors for three primary reasons. The first fundamental reason is that a high level of perceived organizational justice fosters employee satisfaction with both the work process and the organization, thereby motivating them to actively participate in extrarole behaviors [24]. The second reason is that organizational justice cultivates trust in the organization and its operational mechanisms [55], thereby reducing perceived anxiety and threat associated with engaging in challenge-oriented organizational citizenship behaviors. Lastly, inclusive leadership and organizational justice operate synergistically. Previous research has predominantly focused on the behavior-driven aspects of inclusive leadership, neglecting the evaluation mechanisms that influence the occurrence of challenging behaviors within organizations. Our findings suggest that fair evaluation mechanisms and confidence in their effectiveness lead organizational members to believe that their creative ideas and challenge-oriented organizational citizenship behaviors, aimed at enhancing organizational performance, will be appropriately recognized. This insight enhances our understanding of the effectiveness of inclusive leadership and organizational justice.

In addition, this study provides guidance to nurse management leaders and nurses in their work practices. On the one hand, inclusive leadership respects and recognizes the commitment and abilities of subordinates, cares for their needs and work status, and reinforces the social exchange of material and emotional relationships, leading to more positive work attitudes and innovative practices based on well-intentioned starting points. On the other hand, inclusive leadership implies a more tolerant attitude towards behaviors that may drive organizational change, which obviously have the potential to cause friction and conflict in the organization; however, organizational justice means that these behaviors are evaluated objectively and appropriately, thus creating a positive motivational effect on the functioning of the organization, which also implies that the leader becomes a facilitator rather than a controller [56]. In sum, how to promote organizational justice and how to motivate challenge-oriented organizational citizenship behaviors is what each member of the organization needs to contemplate, both as an effective working tool in the practice of nurse management, which in many cases is already a necessity, and as the ultimate purpose of achieving iterative renewal of the organization itself.

6. Limitations and Future Research

We recognize that this study has some limitations, in that they also offer directions that could be investigated in the future. First, the cross-sectional study design employed in the current study restricts the ability to establish causal relationships. Consequently, future studies should consider both longitudinal and experimental study designs. Second, the study results are based on self-reported data, which may

be subject to response bias and subjectivity. Therefore, the findings are only applicable to the sample and responders of the study and cannot be generalized to all contexts, particularly those with unstable organization and structure. Finally, more about individuals, organizations, and the relationships between them and nurse-specific contexts needs to be investigated in future research. On the one hand, as the results of this study, inclusive leadership promotes organizational justice and motivates challenge-oriented organizational citizenship behaviors, then under conditions of such motivational compatibility between individuals and organizations, Person-Organization Fit can be enhanced [57], especially considering the level of compassionate behaviors of the nurses when serving patients, which may not only change the underlying contexts and thresholds at which inclusive leadership functions, but Person-Organization Fit and organizational justice may also complementarily motivate the extrarole behaviors of nurses. On the other hand, in view of the characteristics of nurses' work, they often need to pay more attention to the needs of others for help, which include both physical and psychological, then positive thinking plays an important role as a positive personal resource, which can help nurses self-regulate their negative emotions into a more positive direction, so that they can achieve a higher level of positive emotions and psychological flexibility [58], especially in the context of high-intensity nursing care, leading them to engage in more behaviors beyond their own self-interest.

7. Conclusion

The current study provides additional evidence of the necessity of inclusive leadership in building organizational justice and inspiring nurses' challenge-oriented organizational citizenship behaviors. At the same time, this study reveals and validates the mediating role of organizational justice in the mechanism of inclusive leadership on challenge-oriented organizational citizenship behaviors. Nurse leaders can motivate such extrarole behaviors by consciously establishing organizational justice, which also means that organizational justice has the dual property of being the purpose and the effective methods of nurse management.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available because of privacy or ethical restrictions.

Ethical Approval

Ethical approval for this study was obtained and registered at the West China School of Medicine and the West China Hospital of Sichuan University (#2022-1479) on October 9, 2022.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Characterising Potential Subtypes and Influencing Factors of Sleep Quality in Psychiatric Nurses by Latent Profile Analysis

Xiaoshi Pan , Jiayi Wang , Ke Zhang , Chenxin Yang , Minghong Tang ,
Zhaoxin Feng, Li Liu , and Hui Wu 

Department of Social Medicine, School of Health Management, China Medical University, Shenyang 110122, Liaoning, China

Correspondence should be addressed to Li Liu; liu09@cmu.edu.cn and Hui Wu; hwu@cmu.edu.cn

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Background. Sleep is a crucial factor affecting an individual's physical and mental health. Psychiatric nurses work under high stress and load, and it is necessary to understand the sleep quality of psychiatric nurses and the influencing factors. However, individual-centred studies of psychiatric nurses' sleep are limited. **Aims.** To explore the heterogeneity in sleep quality among psychiatric nurses, to identify the factors influencing different subtypes, and to provide targeted strategies and measures to improve their sleep quality. **Methods.** From August to October 2022, 298 psychiatric nurses working in a mental health centre in Liaoning Province were selected as the participants. The study involved administering the following two questionnaires: the general information questionnaire and the Pittsburgh Sleep Quality Index (PSQI). Data analyses included latent profile analysis, Kruskal–Wallis *H* test, and multiple logistic regression. **Results.** The prevalence of poor sleep quality (PSQI >5) among psychiatric nurses was 54.7%. The sleep quality of psychiatric nurses could be classified into the following three distinct profiles: good sleep quality, moderate sleep quality, and poor sleep quality. Nurses who were over 40 years of age, unmarried/divorced/separated/widowed, worked more than 40 hours per week, experienced significant life events in the past year, had poor nurse-patient relationships, and had chronic diseases were more likely to have poorer sleep quality. **Conclusions.** There was significant heterogeneity in sleep quality among psychiatric nurses. Age, marital status, work schedule, total weekly working hours, night shifts, special life events, nurse-patient relationships, and chronic diseases were associated with their sleep quality. **Implications.** The heterogeneity and influencing factors of sleep quality in psychiatric nurses provided evidence for individualized interventions in the future. This trial is registered with ChiCTR2200062347.

1. Introduction

Sleep as a periodic and reversible resting phenomenon is one of the most important life activities in human daily life. Chronic sleep problems accelerate aging and fat accumulation [1] and increase the occurrences of serious diseases of cardiovascular and cerebrovascular diseases [2, 3]. At present, scholars generally measure sleep quality at the subjective and objective levels [4]. However, objective definitions are hard to be used, as they are limited to physiological and behavioral aspects and are difficult to be obtained [5]. Thus, self-reported subjective feelings remain the most consistent measure of sleep quality [6]. On a subjective level, Buysse's definition has been the most

widely used [7], which claims that sleep quality is an overall concept that integrates the seven components of subjective sleep quality, and assesses the level of sleep quality by the Pittsburgh Sleep Quality Index (PSQI). The cutoff scores of PSQI cutoff vary across populations [8], in which sleep quality of nursing staff PSQI >5 is the most commonly recognized [9].

Psychiatric nurses, who belong to a highly specialized occupational group, are required to care for patients with psychiatric problems and often behave abnormally with self-harm and aggressive behavior. In addition, some patients may also be accompanied by physical illness and complications. Psychiatric nurses need to attend to the various needs of patients and changes of patients' physical and

mental states [10]. Encountered with numerous challenges, psychiatric nurses are subject to high tension and sleep deficit due to long hours of pressurized work [11]. According to studies, the prevalence of poor sleep quality among psychiatric nurses in China is 53.08%–71.50% [12, 13], significantly higher than that of general nurses in previous studies, which indicates that psychiatric nurses have serious sleep problems due to their professional particularity.

Poor sleep quality among psychiatric nurses damages their physical and mental health and affects the efficiency and safety of their nursing work [14]. The harmful impacts include the fluctuation of immune biomarkers [15], periodontal disease [16], headache [17], anxiety or depression [18], and cognitive impairment [19]. In addition, it can negatively affect nurses' attention, memory, judgment, and the ability to communicate effectively. As a result, they may become slower to respond, less motivated, less productive at work, and changes in the patient's condition may go unnoticed or even risk medical errors [20]. Therefore, improving the sleep quality of nurses and managing their occupational health has become a public health concern to the whole society.

Spielman [21] proposed the "3P" theoretical model of insomnia, indicating that individual sleep quality is affected by predisposing factors, precipitating factors, and perpetuating factors, and chronic insomnia will occur when these three types of factors interact [22]. Among them, the predisposing factors of insomnia refer to the personal characteristics of insomnia, that is, who is more prone to insomnia. The precipitating factors of insomnia refer to the causes of insomnia in the first place. The perpetuating factors are the factors that make insomnia last for a long time, including unhealthy behavioral habits and incorrect cognition. Based on the abovementioned theoretical model, we selected age, gender, marital status, education, and monthly income as the predisposing factors of poor sleep quality of psychiatric nurses; working age and working mechanism. Working hours per week, night shifts, special events, nurse-patient relationships and chronic diseases were cited as the precipitating factors [23, 24]. The abovementioned influencing factors on the sleep quality of nurses are the basic support for managers to intervene nurses' sleep.

At present, many studies on the sleep quality of nurses determine their sleep quality status based on the total score of sleep-related scales, and the exploration of the influencing factors of sleep quality of nurses also ignores the heterogeneity of their sleep-related problems [25, 26]. "Heterogeneity" means that individuals differ in their characteristics and attributes, leading to differences in behaviors, beliefs, needs, abilities, and other aspects. The existence of heterogeneity indicates that each individual may have different sleep quality problems [27].

Some studies have suggested an individual-centred approach rather than a variable-centred approach to differentiate between individuals in terms of heterogeneity in sleep quality. Some scholars have found group heterogeneity in the sleep quality of nurses; Han et al. [28] divided 465 nurses into a high-symptom group and a low-symptom group based on their scores on the General Sleep

Disorder Scale. Slavish et al. [29] classified nurses' sleep status as "poor overall sleep," "nightmares only," "good overall sleep," "only nightmares," and "overall good sleep" based on their sleep diary records.

Although previous studies have provided us with information on the validity of the latent profile analysis (LPA), a person-centred method that reveals heterogeneous subgroups of individuals with the expressions of multifaceted features, the subtypes of sleep quality in psychiatric nurses are currently unknown. Due to the specificity of the patients they serve, psychiatric nurses are under higher levels of stress and their sleep quality is expected to be different from general nurses in other departments. Therefore, the identification of psychiatric nurses' sleep quality subtypes is important for the subsequent development of specific sleep interventions.

2. Materials and Methods

2.1. Design. This study is an exploratory, quantitative, individual-centred cross-sectional study.

2.2. Participants. The sample size was calculated by the following formula:

$$n = \frac{Z_{1-\alpha/2}^2 \times p(1-p)}{d^2}. \quad (1)$$

The confidence level was 95% (two-sided), $Z_{1-\alpha/2}$ (standard normal variate) was 1.96, p was 60% for the estimated prevalence of poor sleep quality among psychiatric nurses according to the results of previous studies, and d was 6% for the margin of error. Thus, we identified 257 as the minimum sample size for this study.

In addition, a 20% nonresponse rate was considered. In this study, 330 questionnaires were distributed to professional nurses from a mental health centre in Liaoning Province from August to October 2022. The inclusion criteria were as follows: (a) obtaining a nurse practitioner's license and having it in force; (b) nurses registered and working for ≥ 1 year; and (c) frontline nurses working in psychiatric wards. Exclusion criteria for nurses were as follows: (a) nurses on maternity leave, sick leave, sabbatical leave, study, and further training during the survey period and (b) trainee nurses. The researcher contacted hospital administrators to distribute the questionnaire to nurses who met the criteria. Nurses whose responses did not fit the internal logic of the questionnaire were excluded, and 298 valid questionnaires were actually collected with an effective rate of 90.3% in this study.

2.3. Instrument

2.3.1. Sleep Quality. Sleep quality was measured using the Pittsburgh Sleep Quality Index developed by Buysse et al. [7], the Chinese version was revised and compiled in China by Liu and Tang, and the Cronbach's alpha coefficient of the seven main components and each item of the Chinese version of PSQI is higher than that of Buysse's test results

and has high internal consistency, reliability, and validity. It is widely used in the Chinese population [30]. The PSQI comprises the following seven components: (A) subjective sleep quality (number of items=1), (B) sleep latency (number of items=2), (C) sleep duration (number of items=1), (D) sleep efficiency (number of items=2), (E) sleep medication (number of items=9), (F) sleep disturbance (number of items=1), and (G) daytime dysfunction (number of items=2). Scoring involved 7 components, 18 items with each component receiving a score of 0–3 after secondary calculation. The total score ranged from 0 to 21, where higher scores indicated poorer sleep quality for individuals. Previous studies have established various cutoff values for the PSQI across different populations, ranging from 4 to 10 points. In the nursing population, it is generally accepted that a PSQI score >5 indicates poor sleep quality [31, 32]. The scale has been widely used to evaluate the sleep quality of nurses and has good reliability and validity. The Cronbach's alpha coefficient in the study was 0.876, so there was good internal consistency of the Chinese version of PSQI [30].

2.3.2. General Information Questionnaire. The study utilized a self-designed general information questionnaire that focused on gathering demographic and sociological information from psychiatric nurses. The questionnaire included age (≤ 40 years and >40 years), length of service (≤ 10 years and >10 years), gender (male and female), marital status (married or cohabiting and unmarried/divorced/separated/widowed), education (junior college and below and bachelor's degree and above), monthly income (CNY) (≤ 5000 yuan, >5000 yuan), work schedule (fixed schedule and shift work), total weekly working hours (≤ 40 h and >40 h), night shifts (yes and no), whether experienced any special life events such as the death, illness of a relative, promotion, and marriage of children within the past year (yes and no), nurse-patient relationship (good and poor), and whether they suffered from chronic diseases such as hypertension, diabetes, and arthritis (yes and no).

2.4. Data Analysis. This study used SPSS 21.0 and Mplus 8.3 for data analysis. The enumeration data were described as n (%), and the normality of measurement data was tested by Kolmogorov–Smirnov. The normal data were expressed as mean and standard deviation (SD), and the skewed data were expressed as the median and interquartile range. We first conducted the normality test and common method bias test on the data and conducted latent profile analysis with the scores of each dimension of sleep quality of psychiatric nurses as the dominant variables. LPA is a statistical method that is based on multiple continuous indicators to assess individual characteristics across different components. Through probabilistic calculations, it identifies the subgroup to which an individual is most likely to belong. This method aims to classify individuals into distinct subtypes by identifying similarities in their characteristics. The best classification model is selected based on the merits of the fit indices and the practical significance of the profile.

Table 1 shows the model fit indices [33, 34]. The sleep quality of psychiatric nurses in the three groups did not conform to the normal distribution ($P < 0.05$), so the median and interquartile range were used to describe the sleep quality of nurses. Then, the Kruskal–Wallis H test was used for one-way analysis of variance, and the Dunn's method with a Bonferroni correction for multiple tests was used for post hoc test to compare the differences in demographic characteristics among different subtypes; the statistically significant variables were included in the multivariate multiple logistic regression analysis to identify the influencing factors between different sleep quality subtypes. Two-tailed $P < 0.05$ was considered statistically significant.

2.5. Ethical Considerations. Ethical approval for this study was obtained from the Research Ethics Committee of China Medical University. Informed consent was completed by all participants. The registered number is ChiCTR2200062347.

3. Results

3.1. Common Method Bias Test. The data were tested for common method bias using Harman's single-factor test. The two conditions are that there is more than one factor with eigenvalues greater than 1, and the maximum factor has a variance explained of less than 50% [35]. The results showed that there were 4 factors with characteristic root greater than 1, and the variance explanation of the first factor was 36.23%, which was less than the critical standard of 50%, indicating that there was no serious common method bias in the data of this study.

3.2. Descriptive Statistics. The median score of sleep quality was 6 (3, 10). Among them, 135 nurses (45.30%) reported good sleep quality (PSQI ≤ 5), while 163 nurses (54.70%) had poor sleep quality (PSQI >5), accounting for 54.70% of the total population. Table 2 presents the demographic characteristics of psychiatric nurses. Their median age was 35 (31, 42.5), and the median length of service was 12 (8, 22).

3.3. Identifying the Potential Subtypes of Sleep Quality. The heterogeneity of sleep quality in psychiatric nurses is shown in Table 3. First, based on the scores of seven components of the PSQI scale, one to four latent profile models were sequentially fitted. When the number of profile models increased from 3 to 4, AIC, BIC, and aBIC values reached their minimum, while BLRT was still less than 0.001, and VLMR-LRT was greater than 0.05. However, the entropy value was lower than that of the 3-profiles model, indicating that the 4-profiles model was not better than the 3-profiles model. Finally, the 3-profiles model was chosen as the optimal model because its AIC, BIC, and aBIC values were close to the minimum, BLRT P value and VLMR-LRT P value were less than 0.05 (better than the 2-profiles model), it had the highest entropy value, and the class probability was more than 5%. The posterior probability of the latent profile of psychiatric nurses in the

TABLE 1: The model fit indices for LPA.

Indicators	Criteria
AIC	The smaller the value, the more accurate the classification of the model
BIC	The smaller the value, the more accurate the classification of the model
ABIC	The smaller the value, the more accurate the classification of the model
Entropy	Entropy >0.8 means 90% of individuals are accurately classified
BLRT	The <i>P</i> value of <0.05 indicates that the class <i>k</i> model is superior to the class <i>k</i> -1 model
VLMR- LRT	The <i>P</i> value of <0.05 indicates that the class <i>k</i> model is superior to the class <i>k</i> -1 model
Probability of class	Models with a probability of at least 5% for each category were classified more reasonably

AIC, Akaike information criteria; BIC, Bayesian information criteria; aBIC, adjusted Bayesian information criteria; BLRT, bootstrap likelihood ratio test; VLMR-LRT, Vuong-Lo-Mendell-Rubin likelihood ratio test.

TABLE 2: Demographic characteristics of psychiatric nurses.

Variables	<i>n</i> (%)
Age (years)	
≤40	215 (72.1%)
>40	83 (27.9%)
Length of service (years)	
≤10	125 (41.9%)
>10	173 (58.1%)
Gender	
Male	101 (33.9%)
Female	197 (66.1%)
Marital status	
Married or cohabiting	216 (72.5%)
Unmarried/divorced/separated/widowed	82 (27.5%)
Education	
Junior college and below	82 (27.5%)
Bachelor's degree and above	216 (72.5%)
Monthly income (CNY)	
≤5000 yuan	112 (37.6%)
>5000 yuan	186 (62.4%)
Work schedule	
Fixed schedule	174 (58.4%)
Shift work	124 (41.6%)
Total weekly working hours (h)	
≤40	173 (58.1%)
>40	125 (41.9%)
Night shifts	
Yes	106 (35.6%)
No	192 (64.4%)
Special life events	
Yes	81 (27.2%)
No	217 (72.8%)
Nurse-patient relationship	
Good	232 (77.9%)
Poor	66 (22.1%)
Chronic diseases	
Yes	123 (41.3%)
No	175 (58.7%)

CNY is the standard currency symbol for China Yuan.

three-category model in this study was 100%, indicating that the model fit quality was high, and the model was reliable.

3.4. Latent Profile Characteristics According to the Profiles of Sleep Quality. Table 4 and Figure 1 present the sleep quality scores for each profile identified in this study. Three distinct classes of nurses were identified. Class 1 comprised 110 nurses, accounting for 36.9% of the total population. This profile exhibited standardized scores lower than the other two profiles, with scores below zero in all seven components. Consequently, it was labelled as “good sleep quality”. Class 2 consisted of 116 nurses, representing 38.9% of the total sample. The standardized scores for various components of the PSQI indicated a moderate level of sleep quality, leading to its designation as “moderate sleep quality.” Class 3 included 72 nurses, making up 24.2% of the total participants. This profile demonstrated the highest standardized scores across all components, particularly in subjective sleep quality and sleep medication use. These findings suggest that the overall sleep quality of psychiatric nurses in class 3 is poor, with a higher frequency of sleep medication use and a general perception of poor sleep quality. Accordingly, this class was named “poor sleep quality.”

3.5. Kruskal-Wallis *H* Test of Factors Influencing Sleep Quality Profiles. As shown in Table 5, the Kruskal-Wallis *H* test indicated that there was a significant difference ($P < 0.05$) in age, marital status, education, work schedule, total weekly working hours, night shifts, special life events, nurse-patient relationships, and diseases among different potential profiles across three groups.

Post hoc comparisons using Dunn's method for multiple tests and the Bonferroni method were used to correct the *P* value to indicate that there were significant differences in age (corrected $P = 0.003$), length of service (corrected $P = 0.007$), marital status (corrected $P = 0.024$), education (corrected $P = 0.025$), working schedule (corrected $P = 0.001$), total weekly working hours (corrected $P < 0.001$), night shifts (corrected $P < 0.001$), special life events (corrected $P < 0.001$), nurse-patient relationship (corrected $P = 0.002$), and disease (corrected $P < 0.001$) between the good and poor sleep quality groups. There were significant differences in working schedule (corrected $P = 0.014$) and total weekly working hours (corrected

TABLE 3: Fitness indicators for potential profile models of sleep quality in psychiatric nurses.

Model	AIC	BIC	aBIC	VLMR- LRT (<i>P</i>)	BLRT (<i>P</i>)	Entropy	Probability of class
1	5940.800	5992.559	5948.160	—	—	—	—
2	5129.045	5210.381	5140.611	0.0037	<0.001	0.909	0.681/0.319
3	4384.762	4495.674	4400.533	0.0314	<0.001	1.000	0.369/0.389/0.242
4	4354.604	4495.094	4374.582	0.1411	<0.001	0.993	0.369/0.242/0.362/0.027

Note. LMR and BLRT provide *P* values as a measure of model significance. Abbreviation AIC, Akaike information criteria; BIC, Bayesian information criteria; aBIC, adjusted Bayesian information criteria; BLRT, bootstrap likelihood ratio test; VLMR-LRT, Vuong-Lo-Mendell-Rubin likelihood ratio test.

TABLE 4: Each PSQI component based on the profiles (*M* (P_{25} , P_{75})).

PSQI components	Good sleep quality	Moderate sleep quality	Poor sleep quality
Subjective sleep quality	0 (0, 0)	1 (1, 1)	2 (2, 3)
Sleep latency	1 (0, 1)	1 (1, 1)	2 (1, 3)
Sleep duration	0.5 (0, 1)	1 (0, 2)	2 (1, 2)
Sleep efficiency	0 (0, 0)	0 (0, 0)	0 (0, 1)
Sleep disturbances	1 (0, 1)	1 (1, 1)	2 (1, 2)
Sleep medication	0 (0, 0)	1 (1, 1)	2 (2, 3)
Daytime dysfunction	0 (0, 1)	1 (1, 2)	3 (2, 3)
PSQI	2 (1, 3)	7 (5, 9)	13 (11, 15)

M (P_{25} , P_{75}): Median and interquartile range, PSQI: Pittsburgh Sleep Quality Index.

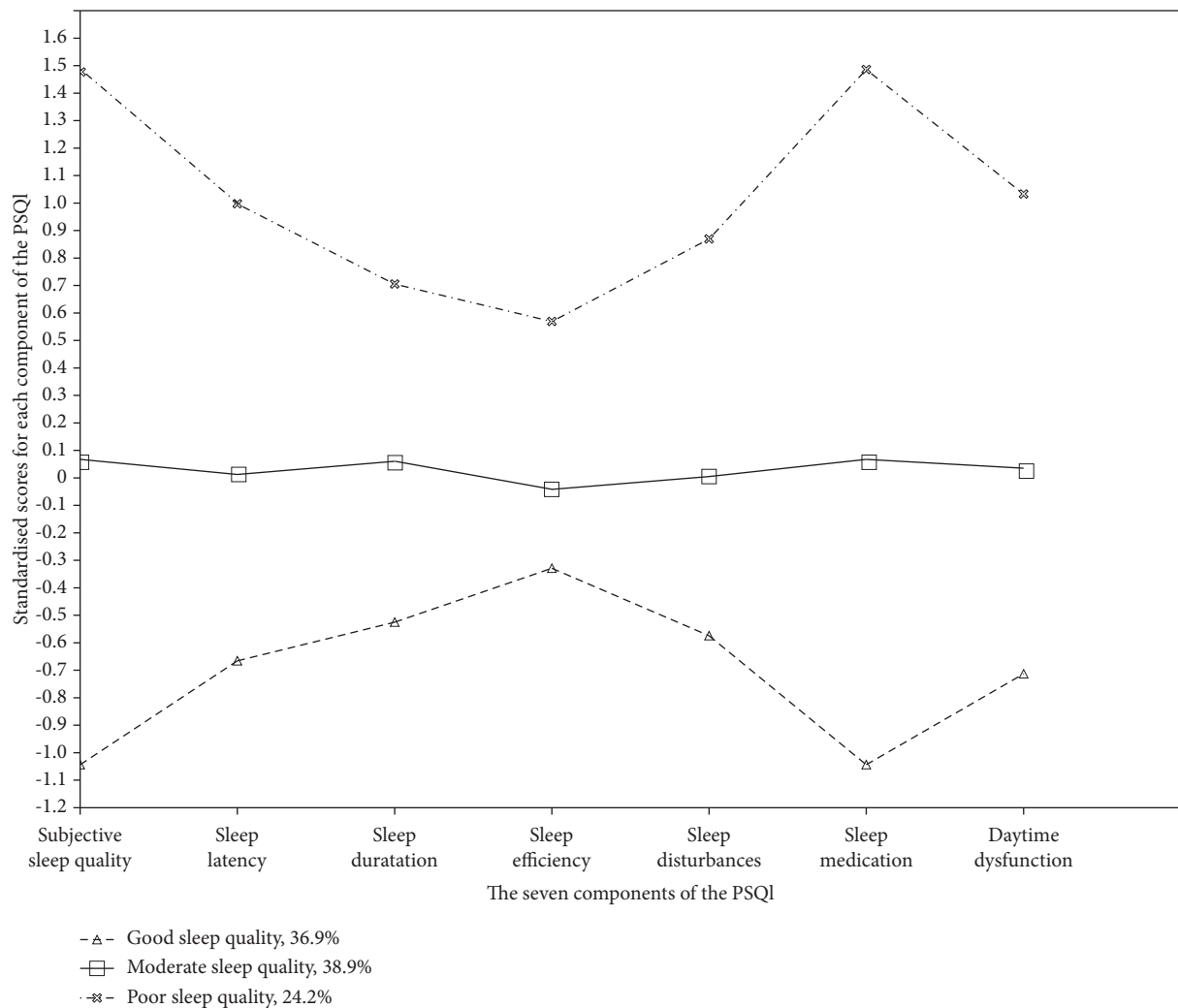


FIGURE 1: The result of latent profile analysis.

TABLE 5: Kruskal–Wallis *H* test of factors influencing sleep quality profiles.

Variable	Good sleep quality	Moderate sleep quality	Poor sleep quality	<i>H</i>	<i>P</i>
Age (years)					
≤40	65 (59.1%) ^a	89 (76.7%) ^{ab}	61 (84.7%) ^b	11.416	0.003
>40	45 (40.9%)	27 (23.3%)	11 (15.3%)		
Length of service (years)					
≤10	38 (34.5%) ^a	48 (41.4%) ^{ab}	39 (54.2%) ^b	9.952	0.007
>10	72 (65.5%)	68 (58.6%)	33 (45.8%)		
Gender					
Male	40 (36.4%)	41 (40.6%)	20 (27.8%)	1.605	0.448
Female	70 (63.6%)	75 (59.4%)	52 (72.2%)		
Marital status					
Married or cohabiting	87 (79.1%) ^a	85 (73.3%) ^{ab}	44 (61.1%) ^b	7.089	0.029
Unmarried/divorced/separated/widowed	23 (20.9%)	31 (26.7%)	28 (38.9%)		
Education					
Junior college and below	38 (34.5%) ^a	32 (27.6%) ^{ab}	12 (16.7%) ^b	6.951	0.031
Bachelor's degree and above	72 (65.5%)	84 (72.4%)	60 (83.3%)		
Monthly income (CNY)					
≤5000 yuan	36 (32.7%)	42 (36.2%)	34 (47.2%)	4.037	0.133
>5000 yuan	74 (67.3%)	74 (63.8%)	38 (52.8%)		
Work schedule					
Fixed schedule	74 (67.3%) ^a	71 (61.2%) ^a	29 (40.3%) ^b	13.627	0.001
Shift work	36 (32.7%)	45 (38.8%)	43 (59.7%)		
Total weekly working hours (h)					
≤40	79 (71.8%) ^a	69 (59.5%) ^a	25 (34.7%) ^b	24.668	<0.001
>40	31 (28.2%)	47 (40.5%)	47 (65.3%)		
Night shifts					
Yes	56 (50.9%) ^a	78 (67.2%) ^b	58 (80.6%) ^b	17.286	<0.001
No	54 (49.1%)	38 (32.8%)	14 (19.4%)		
Special life events					
Yes	12 (10.9%) ^a	36 (31.0%) ^b	33 (45.8%) ^b	28.146	<0.001
No	98 (89.1%)	80 (69.0%)	39 (54.2%)		
Nurse-patient relationship					
Good	95 (86.4%) ^a	90 (77.6%) ^{ab}	47 (65.3%) ^b	11.191	0.004
Poor	15 (13.6%)	26 (22.4%)	25 (34.7%)		
Disease					
Yes	28 (25.5%) ^a	52 (44.8%) ^b	43 (59.7%) ^b	21.997	<0.001
No	82 (74.5%)	64 (55.2%)	29 (40.3%)		

CNY is the standard currency symbol for China Yuan. *Note.* As long as there is the same marked letter, the difference is not significant. Any difference with different marked letters was considered significant ($P < 0.05$).

$P = 0.003$) between the medium and poor sleep quality groups. There were significant differences in night shifts, special life events (corrected $P = 0.002$) and disease (corrected $P = 0.009$) between the good sleep quality group and the moderate sleep quality group.

3.6. Multivariate Logistic Regression Analysis of Factors Influencing Sleep Quality Profiles. Table 6 shows that nurses who are over forty years of age (OR = 2.600 and 95% CI: 1.186–5.698) and experienced special life events (OR = 2.966 and 95% CI: 1.355–6.495) were more likely to belong to the “moderate sleep quality” group compared to the “good sleep quality” group. Then, nurses who were over forty years of age (OR = 3.002 and 95% CI: 1.072–8.409) unmarried, divorced, separated, widowed (OR = 0.365 and 95% CI: 0.154–0.862), worked more than 40 hours per week (OR = 0.273 and 95% CI: 0.121–0.615), experienced specific life events (OR = 4.375 and 95% CI: 1.826–10.479), had a poor nurse-patient

relationship (OR = 0.432 and 95% CI: 0.184–0.971), and had chronic diseases (OR = 2.910 and 95% CI: 1.354–6.252) were more likely to be in the “poor sleep quality” group compared to the “good sleep quality” group. In addition, nurses who worked 40 hours or less (OR = 0.442 and 95% CI: 0.212–0.920) were more likely to belong to the “moderate sleep quality” group compared to the “poor sleep quality” group.

4. Discussion

This study examined the heterogeneity of sleep quality among psychiatric nurses through different aspects of sleep quality. The study used an individual-centred approach to identify the subtypes of sleep quality among psychiatric nurses. The findings revealed that the main reasons for psychiatric nurses belonging to the “poor sleep quality” group were poor subjective sleep quality and frequent use of hypnotic medication. Moreover, the study investigated the

TABLE 6: Hierarchical multiple logistic regression analysis of factors influencing sleep quality profiles.

Variables	Moderate sleep quality		Good sleep quality		Poor sleep quality	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
(a)						
<i>Model 1</i>						
Age (reference: 40 years old or less)	2.282 (1.285, 4.053)	0.005	3.839 (1.821, 8.096)			<0.001
More than 40 years old						
<i>Model 2</i>						
Age (reference: 40 years old or less)	2.353 (1.212, 4.562)	0.011	3.069 (1.288, 7.313)			0.011
More than 40 years old						
Marital status (reference: married or cohabiting)	0.685 (0.303, 1.279)	0.261	0.317 (0.148, 0.677)			0.003
Unmarried/divorced/separated/widowed						
Education (reference: bachelor's degree and above)	1.050 (0.542, 2.063)	0.883	0.598 (0.256, 1.396)			0.235
Junior college and below						
Special life events (reference: no)	3.016 (1.355, 6.495)	0.005	5.213 (2.248, 12.089)			<0.001
Yes						
Disease (reference: no)	2.002 (1.075, 3.728)	0.029	3.499 (1.675, 7.309)			0.001
Yes						
<i>Model 3</i>						
Age (reference: 40 years old or less)	2.600 (1.186, 5.698)	0.017	3.002 (1.072, 8.409)			0.036
More than 40 years old						
Length of service (reference: 10 years or less)	0.866 (0.418, 1.793)	0.699	0.829 (0.342, 2.009)			0.677
More than 10 years						
Marital status (reference: married or cohabiting)	0.622 (0.303, 1.279)	0.197	0.365 (0.154, 0.862)			0.022
Unmarried/divorced/separated/widowed						
Education (reference: bachelor's degree and above)	1.058 (0.542, 2.063)	0.870	0.539 (0.221, 1.313)			0.174
Junior college and below						
Work schedule (reference: fixed schedule)	1.589 (0.735, 3.437)	0.239	2.829 (1.132, 0.453)			0.791
Shift work						
Total weekly working hours (reference: 40 hours or less)	0.617 (0.312, 1.222)	0.166	0.273 (0.121, 0.615)			0.002
More than 40 hours						
Night shifts (reference: no)	1.291 (0.604, 2.758)	0.510	1.073 (0.408, 2.823)			0.887
Yes						
Special life events (reference: no)	2.966 (1.355, 6.495)	0.007	4.375 (1.826, 10.479)			0.001
Yes						
Nurse-patient relationship (reference: good)	0.707 (0.338, 1.480)	0.358	0.423 (0.184, 0.971)			0.042
Poor						
Disease (reference: no)	1.809 (0.954, 3.431)	0.069	2.910 (1.354, 6.252)			0.006
Yes						

TABLE 6: Continued.

Variables	Reference: Moderate sleep quality		P
	OR (95% CI)	Poor sleep quality	
<i>Model 1</i>			
Age (reference: 40 years old or less)	1.682 (0.777, 3.645)		0.187
More than 40 years old			
<i>Model 2</i>			
Age (reference: 40 years old or less)	1.305 (0.561, 3.034)		0.536
More than 40 years old			
Marital status (reference: married or cohabiting)	0.463 (0.234, 0.916)		0.027
Unmarried/divorced/separated/widowed			
Education (reference: bachelor's degree and above)	0.570 (0.257, 1.263)		0.166
Junior college and below			
Special life events (reference: no)	1.729 (0.884, 3.381)		0.110
Yes			
Disease (reference: no)	1.714 (0.896, 3.406)		0.101
Yes			
<i>Model 3</i>			
Age (reference: 40 years old or less)	1.155 (0.438, 3.045)		0.771
More than 40 years old			
Length of service (reference: 10 years or less)	0.957 (0.434, 2.109)		0.912
More than 10 years			
Marital status (reference: married or cohabiting)	0.586 (0.272, 1.265)		0.173
Unmarried/divorced/separated/widowed			
Education (reference: bachelor's degree and above)	0.510 (0.223, 1.166)		0.110
Junior college and below			
Work schedule (reference: fixed schedule)	0.712 (0.313, 1.621)		0.419
Shift work			
Total weekly working hours (reference: 40 hours or less)	0.442 (0.212, 0.920)		0.029
More than 40 hours			
Night shifts (reference: no)	0.831 (0.340, 2.031)		0.685
Yes			
Special life events (reference: no)	1.475 (0.736, 2.953)		0.273
Yes			
Nurse-patient relationship (reference: good)	0.598 (0.296, 1.208)		0.152
Poor			
Disease (reference: no)	1.609 (0.812, 3.187)		0.173
Yes			

impact of nurses' individual family life and work characteristics on their sleep quality, thereby opening up the perspective of the research on the influencing factors of sleep quality among psychiatric nurses.

4.1. Sleep Quality in Psychiatric Nurses. The median of PSQI score for the 298 psychiatric nurses in a mental health centre in Liaoning Province was 6 (3, 10). Among the participants, 135 nurses (45.30%) had good sleep quality (PSQI \leq 5) while 163 nurses (54.70%) experienced poor sleep quality (PSQI $>$ 5). These findings indicate a relatively high incidence of poor sleep quality among psychiatric nurses in Liaoning Province, suggesting a more severe sleep problem that may be related to their professional characteristics and work pressure.

This study analyzed the sleep quality of psychiatric nurses using the LPA method. Based on the fitness indicators, the sleep quality of psychiatric nurses could be divided into the following three subgroups: the "good sleep quality" group, the "moderate sleep quality" group, and the "poor sleep quality" group.

The "moderate sleep quality" group had the highest number of nurses, which accounted for 38.9% of the total participants. The group exhibited relatively balanced scores across the seven components of the PSQI, indicating that more than one third of psychiatric nurses commonly experienced comprehensive sleep issues without any specific sleep problems. The "poor sleep quality" group of psychiatric nurses comprised 24.2% of the total participants, with the median PSQI score of 13 (11, 15). Within this group, subjective sleep quality and the use of hypnotic medication scored the highest compared to the other five components, suggesting that these two issues have a significant impact on impairing sleep quality. This may be attributed to the irregular behaviors and emotions displayed by psychiatric patients, which impose additional pressure and challenges on nursing work, leading to physical and mental burdens on nurses [10]. This contributes to poor sleep quality and increasing their demands for sleep medication.

4.2. Influencing Factors of Sleep Quality Profiles in Psychiatric Nurses

4.2.1. Age. The findings indicated that nurses aged over 40 years were more likely to belong to the "moderate sleep quality" and "poor sleep quality" groups compared to the "good sleep quality" group. Chang et al. showed that nurses over 40 years old were more likely to have sleep disorders [36], and other studies proved that older age was a risk factor for poor sleep quality among nurses [37]. Most female nurses over 40 years old are experiencing menopause or menopause, and the fluctuation of body hormone levels affect their sleep quality [38]. In addition, older nurses may have to bear more responsibility and pressure at work and at home and are more likely to suffer from chronic diseases or other occupational diseases for

a long time, which are the reasons for poor sleep quality of older nurses (especially those over 40 years old) [39]. Therefore, managers should provide enough rest time for older nurses to recover energy and balance various relationships, reduce the work intensity, arrange assistance personnel, and optimize work processes to improve the sleep problems of older nurses.

4.2.2. Marital Status. The result indicated that unmarried/divorced/separated/widowed nurses were more likely to belong to the "poor sleep quality" group compared to the "good sleep quality" group, suggesting that these nurses had poorer sleep quality. Previous studies also had similar findings, showing that sleeping with the spouse can effectively improve sleep quality and overall health [40, 41]. Clinical and epidemiological studies consistently demonstrate that feelings of loneliness can have a detrimental impact on sleep quality [42]. Conversely, having a supportive spouse or partner has been found to contribute to better sleep quality. Moreover, the emotional support and sense of security provided by a significant other can positively influence an individual's mental wellbeing, further enhancing their sleep quality [43].

4.2.3. Total Weekly Working Hours. The result indicated that nurses who worked more than 40 hours per week were more likely to belong to the "poor sleep quality" group compared to both the "moderate sleep quality" and "good sleep quality" groups. This finding aligns with previous studies that have shown a correlation between longer working hours and poorer sleep quality among nurses [44]. The reason may be that longer working hours need nurses to maintain a high level of concentration and endure long hours of standing to handle demanding nursing tasks. Both mental and physical fatigue can contribute to an increased sense of fatigue among nurses, thereby increasing their risk of experiencing poor sleep quality [45].

4.2.4. Special Life Events. The findings of the study indicated that nurses who experienced special life events in the past year were more likely to belong to the "moderate sleep quality" and "poor sleep quality" groups compared to the "good sleep quality" group. Both negative and positive life events can have an impact on the sleep quality of psychiatric nurses. Previous research has also arrived at similar conclusions, stating that psychological stress resulting from negative events can affect the sleep quality of nurses [46]. However, there exists a complex relationship between positive life events, such as getting married, being promoted, or receiving awards, and sleep quality. Despite these events being positive, they can still lead to sleep disturbances due to arousal [47].

4.2.5. Nurse-Patient Relationship. The study found that nurses who had a poor nurse-patient relationship were more

likely to belong to the “poor sleep quality” group compared to the “good sleep quality” group. A discordant nurse-patient relationship has been identified as a significant predictor of increased work-family conflict [48] and has been found to have a negative correlation with job satisfaction [49]. The increase in work-family conflict and the decrease in job satisfaction can contribute to deterioration in sleep quality [50, 51].

4.2.6. Disease. The result showed that nurses who had the disease were more likely to belong to the “poor sleep quality” group compared with the “poor sleep quality” group. Previous studies have also found a strong association between chronic disease and sleep quality [52, 53]. Nurses with chronic diseases are more likely to experience pain, fatigue, and negative emotions such as depressive symptoms, which can impair sleep quality [54, 55]. Chronic illness can also lead to changes in the social status, career, and family relationships, even increasing their financial burden. Dealing with and adapting to these changes can be psychologically stressful for nurses, which in turn increases the risk of poor sleep quality.

Nurses who were over forty years of age, unmarried/divorced/separated/widowed, working more than 40 hours per week, have experienced significant life events in the past month, had poor nurse-patient relationships, and had chronic diseases were more likely to have poorer sleep quality. In order to improve the sleep quality of older nurses, nursing managers should regularly communicate with nursing staff, assign work assistants, and help nursing staff establish a work-family balance. For nurses without partners, managers should provide adequate care and support. In addition, managers should develop flexible work schedules to help nurses balance clinical and research duties and avoid excessive work hours and fatigue. Managers should pay attention to the psychological state of nurses, understand the recent life experience of nurses, and communicate and intervene in time. Managers should also organize regular training sessions to enable nursing staff to build positive relationships with patients. The organization should organize regular physical examination, grasp the health status of nursing staff in time, arrange work reasonably for nurses with chronic diseases, and give them enough time for rest. In addition, psychiatric nurses who have poor subjective sleep quality and rely on the use of sleep drugs can improve their sleep quality through aromatherapy [56], adequate dietary nutrition [57], cognitive behavioral therapy [58], light therapy [59], breathing relaxation training [60], sleep education [61], exercise [62], and other intervention methods.

4.2.7. Limitations. This study considered the heterogeneity of sleep quality among psychiatric nurses by examining different components and adopting an individual-centred perspective to identify variations within this group. The aim was to provide theoretical guidance and empirical evidence for targeted intervention strategies to improve their sleep quality. However, several limitations should be mentioned.

First, this study is cross-sectional, which means that it could not establish exact causal relationships between variables. Second, the use of self-reported questionnaires introduces the potential for information bias in the study results. Third, the participants were limited to nurses from a specific psychiatric health centre in Liaoning Province, which may limit the generalizability of our findings. Fourth, this study only investigated whether nurses suffered from chronic diseases, ignoring that different types of chronic diseases may lead to different results. Therefore, future research should consider expanding the sampling scope and increasing the sample size and consider the impact of different kinds of chronic diseases on sleep quality of nurses.

5. Conclusions

This study used a person-centred approach and categorized the sleep quality of psychiatric nurses into the following three subgroups: good sleep quality, moderate sleep quality, and poor sleep quality. This suggests that for nurses with poor sleep quality, managers should prioritize addressing their subjective sleep quality and sleep medication use. Age, marital status, work schedule, total weekly working hours, night shifts, special life events, nurse-patient relationships, and chronic diseases were associated with their sleep quality. Managers need to pay attention to psychiatric nurses' sleep and take targeted intervention methods to improve their sleep problems. Individuals should also cultivate healthy behaviors and lifestyles to improve sleep quality.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy or ethical restrictions.

Disclosure

The funder had no role in the study design, the collection, analysis and interpretation of data, the writing of the report, and the decision to submit the article for publication.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Jiayi Wang and Xiaoshi Pan are the co-first authors.

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Review Article

Characteristics of Leadership Competency in Nurse Managers: A Scoping Review

Silvia Perez-Gonzalez ¹, Pilar Marques-Sanchez ², Arrate Pinto-Carral ²,
Alberto Gonzalez-Garcia ¹, Cristina Liebana-Presa ², and Carmen Benavides ³

¹Faculty of Health Sciences, Nursing and Physiotherapy Department, Universidad de León, León 24007, Spain

²Faculty of Health Sciences, Nursing and Physiotherapy Department, SALBIS Research Group, Campus de Ponferrada, Universidad de León, León 24401, Spain

³Department of Electric, Systems and Automatics Engineering, SALBIS Research Group, Universidad de León, León 24007, Spain

Correspondence should be addressed to Alberto Gonzalez-Garcia; agong@unileon.es

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Aim. Identify the characteristics of leadership competency for the nurse manager and describe the most cited leadership styles in the literature. **Background.** Leadership is a fundamental competency for nurse managers, as it plays an important role in the healthcare environment to achieve Sustainable Development Goals and promote people-centered organizations. Therefore, understanding the characteristics of leadership and the leadership style to be employed is important. **Methods.** A scoping review was conducted from January 2009 to January 2024 using the design of González Garcia et al., the Arksey and O'Malley framework, and databases including Web of Science, Scopus, and PubMed. Articles reporting on the characteristics of leadership for nurse managers were reviewed. The authors performed the review based on a search syntax, inclusion and exclusion criteria, and the data extraction process. **Results.** Sixty-two studies were included in the final review. The review identified 38 characteristics related to leadership competency, among which we highlighted caring for nurses as individuals, being a visionary, knowledgeable, a change agent, and a communicator. This review highlights the prevalence of transformational leadership, which constitutes 69.57% of the leadership styles cited, and underscores its pivotal role in improving the work environment, effectiveness in nursing care, conflict management, team commitment, and adaptability to change within healthcare settings. **Conclusions.** The most commonly cited characteristics of leadership include caring for the team, effective communication, and a vision for change. Transformational, people-centered, and motivational leadership is the most appropriate style. **Implications for Nursing Management.** The characterization of leadership competency will allow the development of training adapted to the current requirements for nursing leaders. This training could be developed in simulation and virtual reality environments. It also allows for a deeper understanding of how leadership competency affects teams and their functioning.

1. Introduction

Leaders in healthcare organizations must inspire coordinated actions and foster a social movement to achieve the Sustainable Development Goals (SDGs), which require the development of people-centered ethical behavior [1, 2]. This leadership style can be defined as one that focuses on achieving the highest levels of motivation of people through the development of four components: idealized influence, inspirational motivation, intellectual stimulation, and

individual consideration [3]. They should be responsible for positive changes in social and health systems throughout the world, taking into account not only the interests of the organization but also the interests of the society in which it operates [4]. The SDGs refer to the global challenges facing countries and their populations [5].

Nurses are associated with the SDGs, as their work involves concern for the health impact on patients and populations [6]. It is important to note that nurses, from a crucial position, address social determinants of health,

understanding the link between public health conditions and their impact on the population [7]. In this sense, the nurse should exercise a participatory and collaborative leadership style within work groups and society [8]. Furthermore, nurses' leadership focused on the SDGs would have clear benefits related to improving global health, progress toward gender equality, and strengthening economies [9]. Similarly, the World Health Organization (WHO) highlights the relationship between nursing leadership and its influence on education (SDG 4), gender relations (SDG 5), and work and economic growth (SDG 8) [10]. Benton et al. [11] also noted that the 17 SDGs have a significant impact on people's health, underscoring the crucial role of nursing leadership in coordinating actions to achieve these goals.

Furthermore, the nurse managers play a relevant role in the success of healthcare institutions in the management of governance, quality, and sustainability, as well as in terms of health objectives and the SDGs [12]. In addition, nurse managers establish strategies that guide nurses in their professional actions, generate environments for nursing practice, and support organizational development, influencing public health policies and positioning nurses in an ever-changing healthcare environment [13]. Thus, developing competencies to effectively manage healthcare organizations becomes crucial, especially when these roles serve as a vital link to clinical practice [14].

In this sense, the competency model for the nurse manager developed by González García [15] provides a core of eight competencies that nurses must develop in managerial roles in healthcare organizations [16]. These core competencies described by González García [15] include leadership.

The leadership competency of the nurse manager could be defined as the ability to influence other professionals to achieve common objectives and a shared vision [17, 18]. This competency is especially important in healthcare organizations because it is responsible for generating professional commitment, reducing conflicts in workgroups, and creating relationships between team members [19]. Furthermore, research has found that the leadership style of the nurse manager is a key determinant of the quality of care provided by nurses [20, 21]. Research also identifies the transformational leadership style as the most relevant style in the healthcare setting [18, 22] due to its ability to achieve commitment, reduce stress, prevent burnout, and achieve better health outcomes and higher quality nursing care [23, 24].

The relationship between the SDGs, leadership, economic, and sustainability policies with respect to the need to provide quality healthcare is the starting point for the present research [25–27]. However, the review of the literature indicates that it is necessary to deepen the knowledge of leadership competence and its characteristics in the healthcare setting [28–30].

1.1. Aim. The objectives of this scoping review were: (1) to identify and describe the characteristics of leadership competency for the nurse manager and (2) to identify the most common leadership style in the literature.

2. Materials and Methods

2.1. Design. A scoping review synthesizes knowledge, explanations, and interpretations from both qualitative and quantitative research to address the research question. A scoping review is useful for exploring emerging evidence, identifying knowledge gaps, and providing rigorous and transparent methods for identifying and mapping available evidence [31]. This methodology enables the systematic and meaningful extraction of data [32]. According to Tricco et al. [33], this research adhered to the checklist proposed by PRISMA-ScR.

In addition, this scoping review followed the methodology conducted by Gonzalez-Garcia et al. [34], as this article belongs to the line of research focused on the development of competencies for nurse managers. The same keywords were used to refer to the nurse manager, as well as the same approach to competencies and characteristics. Likewise, the same article selection and quality criteria were used. Regarding data extraction and coding systems, the same tools and strategies adapted to the purpose of the competency that is the focus of this part of the research were used.

2.2. Search Methods. The scoping review was conducted according to Arksey and O'Malley [31], which involved: Identifying the research question, identifying relevant studies, choosing studies, identifying data, collecting, summarizing, and reporting results.

The research questions were as follows:

- (1) What are the characteristics of leadership competency for the nurse manager?
- (2) What are the characteristics of leadership competency that are most often cited in the literature?
- (3) What is the most cited leadership style in the literature?

Relevant articles published between 2009 and 2024 were searched in electronic databases, including Web of Science, Scopus, and PubMed. The search terms included references to nurse managers and leadership competency (Table 1).

The inclusion criteria for the articles in this scoping review included quantitative, qualitative, and mixed methods studies, theses and dissertations, and reviews. Articles published between January 1, 2009, and January 30, 2024, in English or Spanish, were included to guarantee the synthesis of updated knowledge, considering that the role of nurse managers and leadership has evolved in recent years. The exclusion criteria included conference abstracts, editorials, and discussion papers, as well as articles with no data on the leadership characteristics of the nurse manager.

We limited our search to the articles that resulted from our search equations and did not include gray literature. Additionally, we did not conduct a snowballing search.

2.3. Quality Appraisal. An evaluation of the quality of the included articles was performed. Since developed and validated tools for assessing the different methodologies of the

TABLE 1: Search strategy.

Database 2009–2024	Search terms
WOS	TI = (leader*) AND TI = (“nurs* manage*” OR “nurse supervisor” OR “nurse program manager” OR “nurse unit manager” OR “chief nurse executive” OR “nurs* administrat*” OR “director of nurs*” OR “head nurs*” OR “frontline manager” OR “nurs* director” OR “nurs* executiv*”) AND TS = (“head nurs*” OR “frontline manager” OR “nurs* director” OR “nurs* manag*” OR “first line nurs* manage*” OR “nurse supervisor” OR “nurse program manager” OR “nurse unit manager” OR “chief nurse executive” OR “nurs* administrat*” OR “director of nurs*” OR “nurs* executiv*”) AND TS = (leader*)
SCOPUS	TITLE-ABS-KEY(“nurs* manage*” OR “nurse supervisor” OR “nurse program manager” OR “nurse unit manager” OR “chief nurse executive” OR “nurs* administrat*” OR “director of nurs*” OR “head nurs*” OR “frontline manager” OR “nurs* director” OR “nurs* executiv*”) AND TITLE-ABS-KEY(leader*)
PUBMED	(leader*) AND ((“nurse administrators”[Majr] OR “nursing, Supervisory”[Majr])

Source: own elaboration.

included publications are lacking, the development of a specific tool to serve this purpose was necessary. To this end, parts of the method presented by Hölbl et al. [35] were used and modified as appropriate (Table 2). The initial quality assessment of the articles was performed by SPG and was independently reviewed by reviewers 2–6 (PMS, AP, CB, AGG, and CLP). Although some studies had medium scores, the authors’ intention was not to remove studies but to assess the overall quality of the existing knowledge base. No articles were excluded according to the quality assessment process.

2.4. Data Extraction. Data extraction was performed using specially designed forms. The following data were extracted from the studies: type of study, sample size, participant characteristics, countries, leadership types, and leadership characteristics. Data analysis was performed using Microsoft Excel.

The authors met regularly to resolve any disagreements about whether the articles met the inclusion criteria. Each of the selected full-text articles was read thoroughly several times by the authors to capture all relevant information and ensure that nothing important was missed. The data set for the paper was constructed by extracting findings that were relevant to the research questions.

Studies, characteristics, and leadership styles were coded using the following process to correctly identify them:

Articles: Coded with the letter “A” followed by three digits, beginning with A001 for the first article.

Characteristics: Coded with the letter “C” followed by three digits, beginning with C001 for the first characteristic.

Leadership style: These were encoded with the letter “L” followed by three digits, beginning with the code “L001.”

For example, the characteristic encoded as “A003 C007” can be identified as characteristic 7 belonging to Article 3. Furthermore, the leadership style encoded as “A003 L003” can be identified as leadership style 3, as described in Article 3.

Using this methodology, we initially cataloged the characteristics of leadership competency described in the articles and assigned a unique code to each. Subsequently, these characteristics were analyzed and grouped if they were identical, and their frequency of repetition was tallied. Any disagreements were resolved by a fourth reviewer (CB).

In this review, the “leadership characteristic” is defined as a description that distinctly recognizes a leadership trait.

3. Results

The selection process is shown in Figure 1. A total of 622 articles were identified from electronic databases and imported into Mendeley for screening. After screening the titles and abstracts, 141 studies remained for full-text review. Finally, 62 studies were included in this scoping review.

3.1. Bibliographic Overview. Sixty-two articles were included in the current scoping review. Table 3 presents the characteristics of the included studies. Of the 62 studies, most were conducted in the USA (54.8%), Finland (7.54%), Iran and China (5.66% each), Australia and Jordan (3.77% each), and 1.88% came from the UK, Saudi Arabia, Singapore, Greece, South Africa, Italy, Japan, Brazil, Lithuania, and Sweden. As a result, 339 characteristics were identified in the 62 articles analyzed. Following the identification of the characteristics, their meanings were analyzed, and those referring to the same leadership characteristics were grouped together. This analysis resulted in 38 leadership characteristics (Table 4).

3.2. Quality Assessment. The highest possible score was 10, while the lowest was 0. The overall average score was 6.70. The average scores for the individual items were as follows: Q1 = 1.34 ± 0.51, Q2 = 1.49 ± 0.60, Q3 = 1.05 ± 0.43, Q4 = 1.59 ± 0.64, and Q5 = 1.21 ± 0.55.

3.3. Most Cited Characteristics. Regarding the five most cited leadership characteristics in the literature, each with a frequency greater than five, they were “Caring for nurses as

TABLE 2: Quality assessment tool adapted from Hölbl et al. [35].

Domain	Indicator (0–2)
Q1-Is the nurse manager leadership characteristics described?	No-moderately-yes
Q2-Are the research objectives clearly outlined?	No-moderately-yes
Q3-Are the main contributions well described to the nurse management leadership?	No-moderately-yes
Q4-How appropriate is the problem-solution fit?	No-moderately-yes
Q5-Are the proposed solutions feasible (scalable, economical, implementable)?	No-moderately-yes

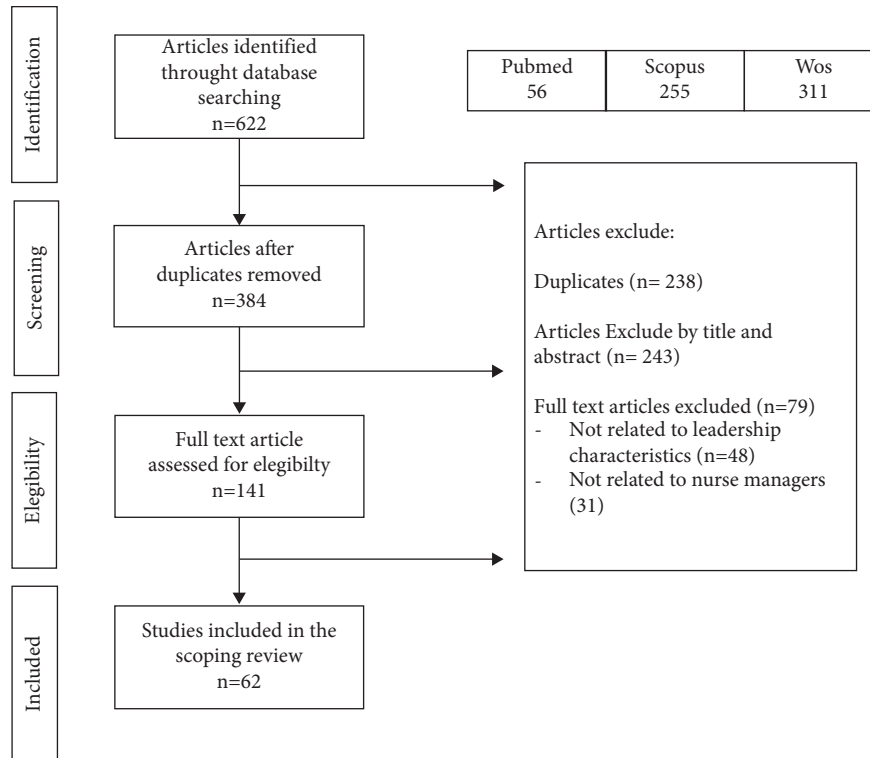


FIGURE 1: Flowchart of the study.

individuals,” “Being visionary” (creating and clearly communicating a personal vision to guide change and enable others to achieve their purpose and take action), “Knowledgeable,” “Change agent,” and “Being a communicator” (Table 4). This requires a combination of personality traits and communication skills.

3.4. Leadership Styles. Furthermore, the leadership styles from which the extracted characteristics originated were analyzed, including a study of their frequencies, resulting in 22 leadership styles, as shown in Table 5. Given the way leadership was referred to in the various articles, it was pertinent to analyze and classify them based on how they were defined. From this analysis, four leadership styles emerged (Table 6). A significant finding was that 69.57% of the articles referred to transformational leadership, as seen in Table 6.

Consequently, the identified leadership characteristics were classified into the four defining dimensions of transformational leadership (Table 7). The most cited characteristics in each of the four dimensions were: in the intellectual stimulation dimension, the most cited characteristic was “knowledgeable” (14.49%); in the individualized

consideration dimension, the most cited characteristic was “Caring for nurses as individuals” (32.34%); “Empowerment” (25.42%) was the most cited in the idealized influence dimension; and “Being visionary” (28.57%) was the most cited in the inspirational motivation dimension.

Subsequently, an analysis was conducted on the influence of leadership on key aspects of nursing team management, such as job satisfaction, effectiveness in patient care, conflict management, team commitment, and adaptability to change in the nursing environment, as shown in Table 8. The results indicate that transformational and relational leadership achieve the highest levels in all areas of analysis, demonstrating a significant impact on job satisfaction, effectiveness in patient care, conflict management, team commitment, and adaptability to change.

4. Discussion

The objectives of this scoping review were to identify the characteristics of leadership competency for nurse managers and to identify and describe the leadership styles most commonly referenced in the literature. The strengths of our methodology include rigorously defined inclusion criteria,

TABLE 3: Description of the articles included in the review.

Author/year	Method	Description/context	Results	Limitations
(Abdelhafiz et al., 2016) [36]	Quantitative, descriptive, and comparative method	The aim is to explore how nurse leaders' leadership styles affect nurses' job satisfaction	The increased development of transformational leadership behaviors increases nurses' job satisfaction and thus contributes to higher nurse retention	Not described
(Albagawi, 2019) [37]	The multifactor management questionnaire was applied to evaluate supervisors' methods of management	Hail City Public Hospitals	The objective is to determine the management style of nurse managers and its consequences in Hail public hospitals	Not described
(Al-Hussami et al., 2017) [38]	Pre-experimental design	61 nurses participated, with a pretest and posttest group in Jordan	The objective is to establish a leadership orientation program that can advance nurses' knowledge while improving their leadership skills and quality of work to promote their readiness for change in healthcare organizations	Not described
(Anderson et al., 2010) [39]	Survey and focus groups	To assess aspects of leadership that help create a healthy work environment that supports the delivery of quality care	The authors discuss their findings and propose a theoretical model to explain the specific characteristics of nursing leadership that support job satisfaction and retention of nursing staff	Not described
(Batson and Yoder, 2009) [40]	Descriptive	Analyzes the influence of nurse manager coaching as a transformational leadership skill and describes an effective coaching process for staff	Although each employee is unique, generational differences that directly affect coaching have been identified	Not described
(Bellack and Dickow, 2019) [41]	Descriptive	The leadership literature is rich with research on characteristics and behaviors that cause leaders to derail	This research examines career derailment risks and explores opportunities to prevent or recover from leadership failure	Not described
(Bernard, 2014) [42]	Descriptive	The Centura Nurse Executive Residency Program is designed for nursing leadership development	Developing high-potential leaders is a critical factor for preparing a cadre of nurse executives	Not described
(Bikmoradi et al., 2018) [43]	Cross-sectional study using Bradberry's emotional intelligence and Metzcas and Bardon's leadership style questionnaires	370 nurse managers from hospitals of Hamadan University of Medical Sciences were surveyed	The emotional intelligence of nurse managers has a significant positive correlation with a people-oriented leadership style and, in contrast, no correlation with a task-oriented leadership style	The emotional intelligence and leadership style of the managers were measured from the managers' own perspectives
(Bish et al., 2015) [44]	Qualitative descriptive study	Semistructured in-depth interviews with rural nursing managers to identify factors influencing leadership	Recognizing factors that influence rural nurse leaders' approaches can help implement context-sensitive leadership development initiatives	Not described

TABLE 3: Continued.

Author/year	Method	Description/context	Results	Limitations
(Cathcart et al., 2010) [45]	Narrative experiences on professional practice	Utilizing Benner's methodology of practice articulation, 32 nurse managers wrote and interpreted first-person narratives of their practice	Complex leadership challenges can be a significant source of experiential learning for individuals and groups	Not described
(Cheng et al., 2018) [46]	Qualitative interviews	Secondary qualitative analysis of 15 nurse manager interviews	Nurse manager leadership is crucial for the successful implementation of evidence-based nursing Managers who completed more leadership courses had implemented significantly more types of innovations and had higher scores on the innovation scale	There is a potential risk of overinterpretation in secondary data analysis studies
(Clement-O'Brien et al., 2011) [47]	Survey method	Directors of acute care hospitals participated in a survey to determine their capacity for innovation		The selection of the state setting limits the generalizability of the findings
(Ebrahimzade et al., 2015) [23]	Cross-sectional study with questionnaire	207 hospital nurses completed a questionnaire assessing demographic characteristics, a measure of burnout, and the Multifactor Leadership Questionnaire (MLQ)	This study sheds light on the effective role of transformational leadership in improving nursing management and reducing burnout among nurses	Not described
(Echevarria et al., 2017) [48]	Predictive correlational design	148 nurse managers used the Genos Emotional Intelligence Inventory, the Multifactor Leadership Questionnaire, and a demographic questionnaire	The study's results underscore the need for continuing education programs in emotional intelligence, leadership development, and leadership assessment	It does not determine the participants' regions and practice environments
(Fennimore and Wolf, 2011) [49]	Descriptive study	The UPMC leadership development for nursing Middle managers program was designed within a conceptual framework. Twenty-five nurse managers participated in the pilot program	Effective nurse manager leadership is vital for successful hospital outcomes, leading to increased nurse retention, reduced turnover costs, and improved quality and financial outcomes for healthcare institutions There is a consensus on specific factors that play a significant role in an organization's safety climate. Generally, the leader's demonstration of commitment to safety is key to cultivating a patient safety culture	There was minimal opportunity to measure the longitudinal impact of the program
(Fischer et al., 2018) [50]	Systematic review on leadership and safety climate and expert panel	A group of 25 international experts in leadership and safety participated in a Delphi study with three rounds of Likert-scale surveys	Social networks, when used wisely, can be a valuable leadership communication tool for today's nurse leaders	Not described
(Flury, 2017) [51]	Descriptive opinion	Nursing leaders in the USA must include social media in their communication strategy to lead healthcare transformation	Cultural competence as a strategic priority can be improved by providing training and holding managers accountable	Not described
(Gergely, 2018) [52]	Qualitative surveys and interviews	132 nurse leaders from AONE were electronically surveyed on influences on the delivery of culturally competent care delivery; interviews with six nurses		Not described

TABLE 3: Continued.

Author/year	Method	Description/context	Results	Limitations
(Goh et al., 2018) [53]	Survey	Nurses in four inpatient wards of an acute hospital in Singapore completed various leadership and commitment questionnaires	RNs observed nurse leaders who showed transformational and transactional behaviors, with less laissez-faire behavior	Not described
(Grubaugh and Flynn, 2018) [54]	Secondary analysis	Data from 257 nurses across 50 medical-surgical units used for secondary analysis, originally collected from a 2012 study	The findings emphasize that the skilled leadership and conflict management of the nurse manager are crucial	Limited by the variables and measures of the original study
(Henriksen, 2016) [17]	Descriptive opinion	Framework for leadership transformation requires redefining the role of the nurse manager	Identifies six key attributes of a chief nursing officer and the effectiveness of an innovative learning approach	Not described
(Heuston and Wolf, 2011) [55]	Descriptive	Discussion on Kouzes and Posner's model and the five practices of exemplary leadership	Highlights the increasing value of leaders who can transform the workforce amid healthcare reforms	Not described
(Hopkinson et al., 2019) [56]	Literature review and focus groups	Constructs identified through literature search and refined via focus groups	Eight constructs emerged in regard to leadership development methods	Communication training was not covered
(Hughes, 2019) [57]	Oral history method	Examines Air Force nursing development through the experiences of a notable military nurse leader between 2004 and 2008	Provides information on the development and impact of air force nursing in a historical, social, and global context	Oral history centered around the experiences of a single nurse
(Kallas, 2014) [58]	Cross-sectional survey	Profile of an excellent nurse manager developed through responses from highly rated US nurse managers	The leadership attributes and competencies of an excellent nurse manager are outlined, in response to the nursing shortage	The tools necessary to identify these attributes are not present in the literature
(Kelly et al., 2014) [59]	Cross-sectional descriptive survey	Survey of 512 hospital managers to assess leadership characteristics	Formal training affects one component of transformational leadership (TL), helping leaders model behavior for employees	The path to leadership positions in nursing remains unclear
(Khan et al., 2018) [60]	Descriptive correlational design	Survey at 2016 Magnet Conference, including full-time nurses with 6+ months of experience	Moderate correlation between transformational leadership of nurse managers and structural empowerment of staff; less so for transactional leadership	The sample is convenience-based, primarily from magnet hospitals or those pursuing the designation
(Kodama et al., 2016) [61]	Cross-sectional study	Nurses assessed leadership styles of nurse managers and related factors of engagement	Intellectual stimulation from transformational leadership can increase staff retention by increasing affective engagement	The convenience nature of the sample limits generalizability
(Kvist et al., 2019) [62]	Cross-sectional survey	Nurses evaluated nurse leaders using the transformational leadership scale (TL)	Nurse managers' qualities were rated moderate by nurses	E-surveys tend to have low response rates

TABLE 3: Continued.

Author/year	Method	Description/context	Results	Limitations
(Lappalainen et al., 2020) [63]	Electronic questionnaires	Finnish nurses responded to electronic questionnaires incorporating the transformational leadership scale (TLS) and the medication safety Scale (MSS)	There is a relationship between nurse managers' transformational leadership and medication safety	The response rate to the questionnaire was not specified
(Lehtonen et al., 2018) [64]	Electronic questionnaire	Nursing staff in Finland evaluated their manager using a leadership and management competencies scale in 2016	Nurses highly value the professional competence in nursing leadership and management. Greater appreciation requires managers to demonstrate education and competence	The results are limited to the specific hospital where the research was conducted
(Liukka et al., 2018) [65]	Semistructured interviews	Eleven nurse managers were interviewed about their actions after adverse events	Certain transformational leadership elements are significant in nurse managers' actions after adverse events	Participant feedback may have increased study validity
(Li and Wivatvanit, 2016) [66]	Delphi technique	Twenty experts participated, focusing on leadership competencies for first-line nurse managers	The consensus on competencies can guide leadership development programs in Shanghai, China	Not described
(Mackoff et al., 2013) [67]	Participatory action research	One-year study to develop "leadership laboratories" with nurse managers as participants and evaluators	Positive results in leadership skills from all laboratories	Not described
(Manning, 2017) [68]	Descriptive correlational design	Survey of 441 nurses in the USA using engagement and leadership questionnaires	Transactional and transformational leadership positively influenced engagement; passive leadership had a negative effect	Not described
(McKinney et al., 2016) [69]	Survey method	Surveys on leadership and intention to leave completed by 3,609 nursing directors	Complexity leadership approaches were correlated with better care outcomes	Not described
(Millet and Porche, 2017) [70]	Descriptive opinion	Discussion on leadership during natural disasters	The unique talents of nurses are crucial in health emergencies and disasters	Not described
(Morsiani et al., 2017) [71]	Two-phase mixed method	Initial phase using the Multifactor leadership questionnaire to associate leadership style with job satisfaction Inclusion of full-time nonsupervisory nurses with more than a year of experience	Italian nurse managers must improve their transformational leadership skills Higher satisfaction with transformational leadership styles over transactional leadership styles	Not described
(Negussie and Demissie, 2013) [72]	Nonexperimental correlation design	Explored nurse managers' perceptions of leadership styles and their impact on patient safety in an academic hospital	Identified common leadership styles among nurse managers and challenges to improve patient safety Leadership is linked with communication and ethics; limited training opportunities postgraduation	Limited to one health sector; could benefit from more in-depth data
(Palweni et al., 2023) [73]	Qualitative exploratory and descriptive study			
(Pereira et al., 2015) [74]	Quantitative study	Study with 15 nurses in hospital management in Brazil		Team strength is a barrier to leadership exercise

TABLE 3: Continued.

Author/year	Method	Description/context	Results	Limitations
(Pishgooie et al., 2019) [75]	Cross-sectional and correlational study	Survey of 1,617 nurses in Iranian government hospitals	Transformational and transactional leadership styles can reduce nurse job stress	Not described
(Player and Burns, 2015) [76]	Descriptive opinion	Discussion on the universality of basic leadership skills	Leadership skills are essential, regardless of the career path; mentoring is a strong motivator	Not described
(Prado-Inzerillo et al., 2018) [77]	Quantitative descriptive study	Survey of 56 hospital chief nursing officers to describe leadership and participation	First study to add to the development of leadership of executive-level nurse leaders in Magnet hospitals	Not described
(Prezerakos, 2018) [78]	Review	Search in electronic databases (PubMed, Scopus, CINAHL) for articles published in English or Greek from 2000 to 2017	Emotional intelligence is a useful tool for nurse leaders and contributes significantly to effective healthcare management	Not described
(Qtait, 2023) [79]	Systematic review of quantitative studies	Study examining the impact of head nurses' leadership styles on nurse performance	Transformational and democratic leadership styles positively impact nurse performance	Not described
(Reyes et al., 2013) [80]	Qualitative study with in-depth interviews	Interviews with 7 directors of nursing about leadership challenges and characteristics during 2008-2010	Challenges include leadership dissonance and leading through ambiguity. Suggests supporting leaders with defined competencies	Not described
(Richey and Waite, 2019) [81]	Organization-wide employee engagement survey	Ann and Robert H. Lurie Children's Hospital/Chicago	The evaluation of data led to the development of the leadership engagement academy (LEA) for frontline nurse managers	Not described
(Saiki et al., 2023) [82]	Cross-sectional study	Assessing the Japanese version of the implementation leadership scale (ILS) among nurse managers and staff nurses	The Japanese ILS is a reliable and valid tool for evaluating leadership in the implementation of evidence-based practice	Not described
(Sandström et al., 2011) [83]	Systematic literature review	Review of leadership and its influence on the implementation process	The review included seven articles and identified three main areas of findings	Not described
(Sharpp et al., 2019) [84]	Interviews and focus groups	Nurse managers' perspectives on technology, communication influence and leadership in the US healthcare system	Nurse leaders need training to fully utilize technology for patient care and management	Participating nurses did not fully share their experiences
(Sherman et al., 2013) [85]	Action-research design for program development and evaluation	Develop and promote an innovative master's degree program in nursing administration for emerging young leaders	Emerging nurse leaders may be well positioned with the right skills to lead in the new era	Not described
(Smamah et al., 2023) [86]	Descriptive correlational cross-sectional study	Examines the relationship between the leadership styles of nurse managers and the motivation and intentions of nurses to change in Jordan	Supportive leadership style scored highest. Positive correlation with nurses' motivation, but no significant correlation with turnover intention	Focus on private hospitals in Jordan, potential self-report bias, limited generalizability

TABLE 3: Continued.

Author/year	Method	Description/context	Results	Limitations
(Spano-Szekely et al., 2016) [87]	Descriptive study to correlate emotional intelligence and transformational leadership practices of nurse managers	Convenience sample of nurse managers at the Magnet 2014/USA conference	Emotional intelligence was positively correlated with transformational leadership	Self-assessment nature of the study
(Swinton and Haverkamp, 2023) [88]	Quality improvement project	Evaluate the effectiveness of nurse leader laboratories in improving leadership competencies among nurse managers	Postintervention increases in emotional intelligence assessment scores and nurse manager skills inventory categories	Small sample size, focus on a specific health system
(Tau et al., 2018) [89]	Quantitative, descriptive, and correlational design	Two questionnaires were used: Wagnild and Young's resilience scale questionnaire and empowering leadership questionnaire	Relationship between nurse manager resilience and leader behavior; high resilience scores linked to greater leader empowerment	Limited to one health sector; individual discussions could provide more in-depth information
(Tyczkowski et al., 2015) [90]	Descriptive and exploratory study design	Study to determine the level and relationship between emotional intelligence and leadership style of nurse managers	Positive relationships found between emotional intelligence and transformational leadership outcomes	Not described
(Valiga, 2019) [91]	Descriptive	Article detailing characteristics of effective leaders and followers, emphasizing leadership outside of managerial positions	Various ways to identify, develop, and strengthen leadership skills	Not described
(Verschuere et al., 2013) [92]	Review on leadership styles	Literature review conducted from January 2000 to September 2011, across multiple databases	A trend suggesting the importance of trust between head nurses and subordinates for positive patient outcomes	Not described
(Walker et al., 2011) [93]	Narrative review	Critical evaluation of selected articles on the influence of leadership on organizational learning and development and undergraduate clinical education	Core leadership factors identified include transformational principles and the role of the nursing unit/CEO	Not described
(Yañez et al., 2016) [94]	Delphi technique	Consensus study among 67 staff members from various hospital services, divided into four groups	Consensus on behaviors displayed by leaders that foster trustworthiness	Not described
(Yoon et al., 2023) [95]	Cross-sectional descriptive online survey design	Study on the mediating effect of patient participation culture between ethical leadership and performance in Korean hospitals	Ethical leadership directly affects performance; patient participation culture partially mediates this relationship	Bias from the self-reported survey and focus on Korean hospitals, limiting generalizability

Source: own elaboration.

TABLE 4: Characteristics of leadership competency and frequencies.

Characteristics	Freq. abs	Freq. rel (%)
Care about nurses as individuals	22	6.49
To be visionary (create and clearly communicate a personal vision to guide change and enable others to achieve a purpose and move to action)	20	5.90
Knowledgeable	20	5.90
Change agent	19	5.60
Being a communicator (versatility—the ability to create a culture based on multiple modes of communication, situational judgment, change management, interpersonal relationships, and continuous feedback systems)	17	5.01
Effective conflict management (intergroup and intragroup conflicts)	16	4.72
Empowerment	15	4.42
Outcomes oriented	12	3.54
Innovation	11	3.24
Establish core values of the nursing team and develop the concept of teamwork	11	3.24
Share decision making	10	2.95
Coaching: Behaviour that educates team members and assists them to become self-reliant	10	2.95
Will and commitment	9	2.65
Promote strategies where staff can use ICT (information and communication technology) fluidly	9	2.65
Practice according to a certain standard for nursing administration practice-assess, plan, intervene, and evaluate	9	2.65
Ethics	8	2.36
Self-control	8	2.36
Inspire	8	2.36
Creativity	8	2.36
Empathy	7	2.06
Serve as a role model for staff	7	2.06
Enthusiasm	7	2.06
Provide autonomy	7	2.06
Understand healthcare economics knowledge, such as unit-cost analysis and cost-benefit analysis	7	2.06
Credibility	6	1.77
Accessible	6	1.77
Listening	6	1.77
Adaptive	6	1.77
Trusted	5	1.47
Emotional intelligence	5	1.47
Charismatic	5	1.47
Building positive relationships with your staff	5	1.47
Visibility	4	1.18
Cultural competence	3	0.88
Passion	3	0.88
Motivate	3	0.88
To be a critical thinker (acquire knowledge and practice using reflective learning cycle skills, such as planning, acting, observing, and reflecting)	3	0.88
Resilience (not only have the ability to survive in difficulty and adversity but are able to display behaviour that will enhance subordinates' ability to thrive)	2	0.59

Source: own elaboration.

quality assessment steps, and the use of a nurse manager competency model validated by a broad panel of experts [96].

We identified 339 characteristics of leadership competency, although this number was reduced to 38 after each characteristic was analyzed individually and grouped according to its meaning. In the scientific literature, only one study classifies the characteristics of competencies but differs in how it classifies the characteristics of leadership. For example, the “ethics” characteristic is not included within leadership but rather as

a separate dimension [97]. On the other hand, the analyzed works consistently specify certain specific attributes in the leadership of nurse managers, often not referring directly to leadership characteristics or discussing leadership in a general way without delving into the competence itself [58, 98].

When comparing some of the characteristics identified in this review with those of other studies that discuss competencies, we observed similarities with our findings. Li and Wivatvanit [66] also prioritized characteristics related to the personal domain in their research, such as self-

TABLE 5: Overview of leadership styles: frequency and prevalence analysis.

Leadership style	Abs freq.	Rel freq. (%)
Transformational leadership	33	47.14
Transactional	8	11.43
Empowerment-based leadership	3	4.29
Innovative leadership	2	2.86
Situational leadership	2	2.86
Complexity leadership	2	2.86
e-leadership	1	1.43
Experiential leadership	1	1.43
Authentic	1	1.43
Situational	1	1.43
Strategic leadership	1	1.43
Reflective leadership	1	1.43
Ethical leadership	1	1.43
Competent leadership	1	1.43
Service leadership	1	1.43
Democratic leadership	1	1.43
Participative leadership	1	1.43
Competent leadership	1	1.43
Emotional intelligence-based leadership	1	1.43
Integral leadership	1	1.43
Resilient leadership	1	1.43
Collaborative leadership	1	1.43
Exemplary adaptive leadership	1	1.43
Adaptive and innovative leadership	1	1.43
Executive leadership	1	1.43
Participative	1	1.43

Source: own elaboration.

TABLE 6: Types of leadership.

Leadership styles	Abs freq.	Rel freq. (%)
Transformational leadership	48	69.57
Transactional and task-oriented leadership	12	17.39
Contextual and adaptive leadership	5	7.25
Participative and democratic leadership	4	5.8

Source: own elaboration.

confidence, serving as a role model for staff, and being innovative and creative. The importance of innovation becomes even more crucial in constantly changing environments, such as healthcare [66].

Our research reveals leadership characteristics related to communication, such as “Being a communicator” and “Listening,” within the Individualized Consideration dimension. In this line of thought, Hopkinson et al. [56] also emphasize communication as a key characteristic in the leadership of nurse managers. Anderson et al. [39] demonstrated how the ability of nurse leaders contributes to creating collaborative environments, reducing costs associated with healthcare, and improving patient safety.

A particularly relevant characteristic that emerges from our research is “knowledgeable,” as it is the fourth most frequent and most frequently cited within the intellectual stimulation dimension. The importance of this characteristic was emphasized by Lehtonen et al. [64], who prioritized the

training of nurse managers in exercising leadership within work teams.

The literature reviewed in this research suggests that nursing leaders must focus on emotional intelligence as one of the fundamental pillars of the leadership of nursing teams, in addition to ensuring care efficiency and patient safety. Bikmoradi et al. [43] echoed this opinion by stating that emotional intelligence is the most relevant aspect that leaders must develop to achieve excellent performance in their work teams.

Furthermore, our research revealed that transformational leadership is predominant in the context of nursing management, with 69.57% of the findings focusing on transformational leadership. This result aligns with those reported by Ferreira et al. [99], Sammut and Scicluna [100], and Duggar [101], who identify transformational leadership as responsible for the best outcomes for nurses and patients, making it suitable for the development of nurse manager roles. Boamah et al. [102] added that transformational leadership exercised by nurse managers is key to nursing team satisfaction, work environment, achieved outcomes, and staff retention.

Regarding the impact of transformational leadership, our research shows that this leadership style is the most relevant for the work environment, the effectiveness of nursing care, conflict management, team commitment, and adaptation to change. Sahan and Terzioglu [103] and Jankeleova and Joniakova [104] point out how transformational leadership has a high impact on all organizational outcomes, especially on job satisfaction of nurses. Lappalainen et al. [63] evidenced a positive correlation between transformational leadership and patient safety.

TABLE 7: Mapping characteristics to transformational leadership dimensions.

Characteristics	Transformational leadership dimension
Care about nurses as individuals	IC
Being a communicator	IC
Empowerment	IC
Sharing decision making	IC
Coaching	IC
Practicing according to a nursing administration standard	IC
Empathy	IC
Providing autonomy	IC
Accessibility	IC
Listening	IC
Emotional intelligence	IC
Building positive relationships with your staff	IC
Cultural competence	IC
Effective conflict management	IC
Establishing core values of the nursing team and teamwork	II
Will and commitment	II
Ethics	II
Self-control	II
Serving as a role model for staff	II
Credibility	II
Trustworthiness	II
Charismatic	II
Visibility	II
Resilience	II
Being visionary	IM
Outcomes-oriented	IM
Inspiring	IM
Enthusiasm	IM
Passion	IM
Motivating	IM
Being a change agent	IM
Knowledgeable	IS
Innovation	IS
Promoting strategies where staff can use ICT	IS
Creativity	IS
Understanding healthcare economics knowledge	IS
Adaptive	IS
Being a critical thinker	IS

Source: own elaboration. Legend: IC: individualized consideration; II: idealized influence; IM: inspirational motivation; IS: intellectual stimulation.

TABLE 8: Impact and applications of leadership in nursing.

Leadership style	Impact on job satisfaction	Efficiency in patient care	Conflict management	Team commitment	Adaptation to change
Transformational leadership	High	Significantly improved	Effective	Significantly improved	High
Transactional and task-oriented leadership	Moderate to high	Maintained or improved with incentives	Effective with clear structure	Moderate to high	Moderate to low
Contextual and adaptive leadership	Variable	Highly adaptable to changing situations	Variable	Highly adaptable	Very high
Participative and democratic leadership	High	Improved with inclusive decision-making	Very effective in collaborative environments	High	High

Source: own elaboration.

Additionally, Alise [105], in her thesis studies, identifies transformational leadership as responsible for the outcomes of conflict management. Likewise, Bagga et al. [106] show

how transformational leadership is significantly related to change management and organizational culture, aligning with Lewans [107], who points out transformational

leadership as key in the implementation of changes in organizations.

5. Conclusions

This scoping review identified and described the characteristics of the leadership competency required for nurse managers, which is key to advancing health management toward the Sustainable Development Goals (SDGs). A total of 339 characteristics were identified in the 62 articles analyzed, which were synthesized into 38 characteristics and categorized into four distinct dimensions, providing a comprehensive structure for understanding the leadership of the nurse manager.

Five characteristics were identified as the most cited in the literature included in the review: caring for nurses as individuals, being a visionary, knowledgeable, agent of change, and being a communicator. The two most frequently cited characteristics were caring for nurses as individuals and being visionary. This underscores the need for nurse managers to adopt a visionary and person-centered leadership style.

The leadership style mentioned most frequently in this review was transformational, focusing on its impact on the work environment, the effectiveness of nursing care, conflict management, team commitment, and change management. Characterized by being person-centered, motivating, and inspiring, transformational leadership appears to be the most appropriate style for nurse managers, oriented toward the SDGs and changing environments of healthcare systems.

Emotional intelligence in the leadership of nurse managers has emerged as a fundamental pillar for improving the efficiency of the nursing team and patient care, in addition to favoring the achievement of health objectives, reducing conflict, and improving the work environment.

Future research should focus on developing various scenarios in which to train leadership competency, as well as evaluating the development of these competencies. Practical applications include integrating these identified characteristics into training programs for nursing managers to enhance leadership effectiveness and organizational outcomes.

6. Limitations

One limitation of this scoping review is the potential variability arising from the diverse contexts represented in the analyzed articles. Although the research team implemented measures to mitigate this challenge and comprehensively capture the knowledge base, some context-specific nuances may affect generalizability.

Moreover, despite employing multiple databases and search strategies in both English and Spanish, relevant studies published in other languages or gray literature sources may have been inadvertently excluded. This could introduce a potential bias toward the general representation of leadership characteristics and styles in nursing management. However, the research team believes that this risk is minimal given the extensive number of sources consulted in the previous phase of the research. We believe that the

results presented bring us very close to knowledge saturation.

7. Implications for Nurse Managers

This research shows a series of characteristics relevant to the development of leadership competency that could be considered when developing training programs for nursing managers.

Undoubtedly, the identified characteristics constitute a body of knowledge necessary to develop the work of a nursing manager. Given the large number of characteristics and the difficulty involved in developing them, the characteristics identified as most cited represent the minimum characteristics that a nurse manager should develop. This body of knowledge leads to the operationalization of the competencies of person-centered, forward-looking leadership.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest with respect to the publication of this article.

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Research Article

Communication Self-Efficacy and Job Satisfaction among Nurses during the COVID-19 Pandemic

Leila Ghahremani ¹, Zakieh Khoramaki ^{2,3}, Mohammad Hossein Kaveh ¹,
Masoud Karimi ¹, Mahin Nazari ¹ and Alejandro Orgambidez Ramos ⁴

¹Research Center for Health Sciences, Institute of Health, Department of Health Promotion, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran

²Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran

³Department of Health Promotion, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran

⁴Department of Social Psychology, University of Málaga, Málaga, Spain

Correspondence should be addressed to Mahin Nazari; manazari@sums.ac.ir

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Introduction. The outbreak of COVID-19 has led to various challenges for healthcare workers, including nurses. Nurses play a critical role in the fight against this disease, and their communication of self-efficacy and job satisfaction has garnered significant attention. This study aimed to investigate the relationship between communication self-efficacy and job satisfaction of Iranian nurses during the COVID-19 pandemic. **Methods.** This study was conducted using a cross-sectional design. A total of 500 nurses working in hospitals in Iran were selected using a convenience sampling method. The communication self-efficacy scale and the job satisfaction scale were used to collect data. **Results.** The study found that nurses with higher communication self-efficacy exhibited better performance and job satisfaction in various work challenges ($r = 0.56, p < 0.001$). However, nurses holding a master's degree or higher reported the lowest average communication self-efficacy and job satisfaction scores during the COVID-19 epidemic. The study also explored the impact of shift work on job satisfaction among nurses and found that nurses working exclusively on the morning shift reported the highest average job satisfaction score. **Conclusion.** The findings of this study suggest that communication self-efficacy is an important factor in predicting job satisfaction among Iranian nurses during the COVID-19 pandemic. Therefore, it is recommended that healthcare organizations provide effective communication training sessions and mental health interventions to enhance nurses' communication self-efficacy and job satisfaction. This can ultimately lead to improved performance and better patient outcomes.

1. Background

With the outbreak of COVID-19 disease, various issues arose in the personal lives of nurses. Failure to fully follow preventive protocols in caring for COVID-19 patients could have turned the nurse into a carrier of the disease and endangered her family, and early onset of the disease led to feelings of fear and insecurity among nurses and their families [1, 2]. For a long time after the epidemic began, hospital staff neighbors always considered them carriers of the disease and avoided them, which led to more loneliness, fear, feelings of insecurity [3], and sometimes

discouragement and regretted their choice of nursing profession and reduced job satisfaction [1].

1.1. Communication Self-Efficacy in Healthcare. Different functional situations in healthcare centers are often stressful and unpredictable [4], and a person's belief in his ability to master the correct and timely response shows the degree of individual self-efficacy. Communication self-efficacy is defined as a person's belief in his ability to communicate effectively in certain situations and the regulation of the thought processes, motivation, and physiological states required for effective communication in a particular situation.

When assessing communication self-efficacy, people's communication skills are not measured but their confidence that they can successfully use any skill they have to communicate effectively in different communication environments [5, 6].

1.2. Nurse Job Satisfaction. Nurses have a great role to play in promoting global health, so it is necessary to plan and invest to improve their quality of life, which will definitely benefit society. By investing in the working conditions and quality of life of nurses, not only the job satisfaction of the nurse and the improvement of his performance will be provided but also the whole healthcare system and ultimately the whole society will benefit [7, 8].

1.3. Study Rationale. In light of the global COVID-19 pandemic, nurses have emerged as key and indispensable members in the fight against this disease [9]. Given their critical role in healthcare, the communication self-efficacy and job satisfaction of nurses have garnered significant attention [10]. Investigating the relationship between the communication self-efficacy and job satisfaction of nurses in the context of the COVID-19 pandemic can contribute to improving working conditions and enhancing nurses' performance in the fight against this disease [11]. Previous studies have demonstrated that nurses' self-efficacy and job satisfaction are closely linked to the quality of healthcare [12–14]. While context and certain social and physiological factors have the potential to influence the self-efficacy and job satisfaction of nurses, identifying these factors and implementing effective interventions can improve these two critical components. However, previous research has been limited by the use of conventional instruments to measure communication self-efficacy and job satisfaction, as well as a lack of consideration of critical situations like the COVID-19 pandemic. Furthermore, data on communication self-efficacy and job satisfaction among nurses during the COVID-19 pandemic are scarce. Therefore, the present study was conducted with the aim of investigating the relationship between communication self-efficacy and job satisfaction of nurses during the COVID-19 epidemic and the factors affecting these two components in this epidemic.

2. Materials and Methods

2.1. Design. All nurses deployed to Shiraz university hospitals to care for COVID-19 patients were eligible for this anonymous cross-sectional study.

2.2. Study Setting and Population. The research participations were the convenience population from the nursing staff of Shiraz public hospitals who had more than two years of work experience and were employed both before and after the COVID-19 era.

To calculate of sample size, we used the previous study [15], considering a 15% invalid questionnaire rate. Therefore, the final sample size was determined as 346.

2.3. Inclusion and Exclusion Criteria. Nursing staff working in hospitals, with more than two years of continuous work experience in the clinical wards of the hospital, no pregnancy, no long-term leave, and no specific diseases were among the inclusion criteria.

The exclusion criterion was the announcement of the nurse's withdrawal from continuing to participate in the study.

2.4. Instruments

2.4.1. Participants' Demographic Profiles. Participants' demographic profiles included questions about age, sex, marital status, number of children, education level, years of work, care history of COVID-19 patients, etc.

2.4.2. Communication Self-Efficacy during the COVID-19 Epidemic (CSE.C). Questionnaire developed by researchers to measure CSE.C was used. The questionnaire was investigator developed based on an extensive literature review. Issues such as the nurse's ability to motivate the patient to describe his problems and concerns, active listening, appropriate nonverbal behaviors, empathy with the patient, checking the patient's awareness of the given information, and creating a plan based on shared decisions with the patient, etc. are stated in the existing questionnaire [16]. On the other hand, several articles have pointed out the importance of the nurse's ability to manage stress in critical situations, the ability to perform tasks with team coordination in critical situations, the ability to make a correct assessment in unexpected events, etc. In the existing communication self-efficacy questionnaire, these dimensions are not mentioned [17–19]. For this reason, we decided to design special questions to measure the communication self-efficacy of nurses during the COVID-19 era. The CSE.C questionnaire was evaluated with 19 questions with a score of 1 from "not at all sure" with a score of 10 to "absolutely sure" with a score of 1, which assesses a person's perception of competence and ability to deal effectively with stressful situations such as COVID-19 era. The total score of this questionnaire is 19–190, and the higher the score, the higher the self-efficacy.

2.4.3. Job Satisfaction during the COVID-19 Epidemic (JS.C). Questionnaire developed by researchers to measure JS.C was used. The questionnaire was investigator developed based on an extensive literature review. It was necessary to select a questionnaire that would measure the different dimensions of job satisfaction among nurses during the COVID-19 era with the fewest questions. Therefore, based on the review of the literature, the existing questionnaires are either designed only for normal working conditions or for other dimensions of job satisfaction in crisis conditions, such as benefits commensurate with the volume and difficulty of the work, managers' understanding of the efforts and tolerance of the hardships of nursing work, and timely encouragement and appreciation, as well as satisfaction with their ability to

provide quality nursing care to patients with COVID-19, have mentioned a little. Therefore, the research team decided to design a questionnaire to measure the job satisfaction of nurses during the COVID-19 era. JS.C questionnaire was evaluated with 8 questions and six-point scoring from a score of one (strongly disagree) to six (strongly agree).

2.4.4. Reliability and Validity. Questionnaire's face and content validity were evaluated by 9 faculty members in the fields of nursing and health education and promotion. Then, based on their opinions, necessary changes were made in CSE.C questionnaire (CVR 0.78 and CVI 0.79) and JS.C questionnaire (CVR 0.76 and CVI 0.82). The reliability of the tool was evaluated through the retest method, which was completed on two occasions with an interval of two weeks by 21 nurses working in other hospitals. The reliability coefficient of the retest results after two weeks was 0.805 and 0.667, respectively, and Cronbach's alpha coefficient was 0.93 and 0.72 ($P < 0.001$).

2.5. Procedure. In order to collect information, while providing a complete description of the project, the questionnaires were provided to the target group online. At the beginning of the questionnaire, the consent form and the purpose of the project were mentioned that the individual's signature and completion of the information meant the individual's consent to participate in the research.

2.6. Statistical Analysis. The study data were analyzed using the SPSS statistical software, version 26. Data analysis and description of variables were performed using descriptive statistics including mean indices, standard deviation, and analytical statistics including independent *T*-test, ANOVA, and Pearson's correlation tests. $P < 0.05$ was considered as statistically significant.

2.7. Ethical Considerations. Ethical approval was obtained from Shiraz University of Medical Sciences and Shiraz Ministry of Education. Moreover, considering that the data collection was online, the participants were asked to read the full description of the study that we posted at the beginning of entering the site, and if they want to participate, select the option "consent to participate in the study."

Ethics Committee code: (IR.SUMS.SCHEANU-T.REC.1400-068).

3. Results

A total of 500 nurses participated in the study and all completed questionnaires were analyzed. Most participants were female (79.8%), married (61.2%), and had a bachelor's degree (86.8%). Their mean age was 33.74 ± 6.8 years, work experience was 9.49 ± 6.44 years, and 44.6% of them mentioned the history of caring for Covid patients in the hospital.

The results of univariate analysis showed that there is no statistically significant relationship between most of the

demographic and work characteristics of nurses (sex, age, education level, number of children, working years, work shift, and care history of COVID-19 patient) with their communication self-efficacy and job satisfaction. The only statistically significant relationship obtained in this study was between the marital status and communication self-efficacy of nurses. The highest mean score of the communication self-efficacy was obtained for the group of widowed/divorced nurses (164.58 ± 22.84). Despite the lack of significant results for average communication self-efficacy and job satisfaction scores, it should be noted that nurses holding a master's degree or higher reported the lowest average communication self-efficacy and job satisfaction scores during the epidemic, respectively (132.47 ± 32.88 and 27.31 ± 7.21).

The results derived from the job satisfaction scores obtained during the COVID-19 pandemic indicate that nurses working exclusively in the morning shift reported the highest average job satisfaction score (29.21 ± 5.22) (Table 1).

Mean and standard deviation of nurses' CSE.C questionnaire total scores were 142.75 ± 30.41 and JS.C scores of 28.11 ± 6.48 were obtained (Table 2).

Table 3 shows the maximum and minimum average score of the participants' answers to the CSE.C and JS.C questions.

The Pearson's correlation test showed positive and significant relationships between CSE.C and JS.C ($r = 0.254$, $P = 0.000$). Nurses who had higher communication self-efficacy in caring for the COVID-19 patient also reported almost higher job satisfaction during the COVID-19 epidemic. Also, a statistically significant correlation was found between age, work shift, and CSE.C (Table 4).

4. Discussion

This study investigated the relationship between communication self-efficacy and job satisfaction during the COVID-19 epidemic among hospital nurses who worked in Shiraz university hospitals.

4.1. Key Findings

4.1.1. Comparison between CSE.C and JS.C Scores among Participants' Demographic Characteristics. The results showed that CSE.C has a significant statistically relationship with the marital status. In Motahari et al.'s study, married students had higher clinical self-efficacy than unmarried students, which is not consistent with the results of the present study [20]. The findings of Asadpour and Sadat Hosseini's study showed that normal women and men have higher self-efficacy compared to divorced people [21], which is not consistent with the results of the present study. To date, research has not consistently shown that the self-efficacy of widowed and divorced nurses, or other widowed and divorced individuals, is higher than single and married people. However, studies that have implemented educational interventions for these groups have demonstrated positive outcomes in terms of mental health and empowerment [21–23]. It is possible that the high levels of

TABLE 1: Associations of sociodemographic variables with nurse's CSE.C and JS.C ($n = 500$).

Characteristics	n (%)	CSE.C score Mean \pm SD	JS.C score Mean \pm SD
<i>Sex</i>			
Female	399 (79.8)	143.46 \pm 29.81	28.08 \pm 6.34
Male	101 (20.2)	139.92 \pm 32.67	28.21 \pm 7.02
P value ^a		0.771	0.154
<i>Age group</i>			
22–32 years	218 (43.6)	139.33 \pm 29.31	27.73 \pm 6.43
33–43 years	243 (48.6)	145.24 \pm 31.98	28.37 \pm 6.63
44–55 years	39 (7.8)	146.33 \pm 24.54	28.56 \pm 5.84
P value ^b		0.084	0.511
<i>Education level</i>			
Associate degree	34 (6.8)	147.12 \pm 28.97	28.65 \pm 7.02
Bachelor	434 (86.8)	143.16 \pm 30.25	28.12 \pm 6.39
\geq Master of Science	32 (6.4)	132.47 \pm 32.88	27.31 \pm 7.21
P value ^b		0.109	0.699
<i>Marital status</i>			
Married	306 (61.2)	143.43 \pm 29.48	28.18 \pm 6.45
Single	182 (36.4)	140.15 \pm 31.84	27.96 \pm 6.68
Widowed/divorced	12 (2.4)	164.58 \pm 22.84	28.50 \pm 3.72
P value ^b		0.021*	0.917
<i>Number of children</i>			
0	265 (53)	142.83 \pm 30.23	27.83 \pm 6.45
1	121 (24.2)	145.38 \pm 31.92	28.45 \pm 6.86
2	101 (20.2)	139.88 \pm 28.14	28.50 \pm 6.16
≥ 3	13 (2.6)	138.85 \pm 37.59	27.54 \pm 6.28
P value ^b		0.570	0.739
<i>Working years</i>			
2–10 years	270 (54)	140.96 \pm 29.85	27.87 \pm 6.29
11–20 years	206 (41.2)	144.27 \pm 31.99	28.45 \pm 6.85
21–30 years	24 (4.8)	149.83 \pm 20.17	27.83 \pm 5.23
P value ^b		0.252	0.621
<i>Work shift</i>			
Morning	33 (6.6)	144.52 \pm 28.21	29.21 \pm 5.22
Morning/evening	38 (7.6)	152.18 \pm 26.85	29.03 \pm 7.34
Rotation	429 (85.8)	141.78 \pm 30.78	27.94 \pm 6.48
P value ^b		0.122	0.368
<i>Care history of COVID-19 patient</i>			
Yes	223 (44.6)	143.23 \pm 31.09	27.93 \pm 6.39
No	277 (55.4)	142.36 \pm 39.90	28.25 \pm 6.56
P value ^a		0.731	0.810

* $p < 0.05$, ^aindependent T -test, ^bANOVA.

TABLE 2: Mean and standard deviation of CSE.C and JS.C

Variables	Mean	SD	Min. score	Max. score
CSE.C	142.75	30.41	19	190
JS.C	28.11	6.48	8	48

communication self-efficacy observed in nurses during the COVID-19 pandemic can be attributed to their participation in effective communication training sessions and mental health interventions. Further research is required to confirm this hypothesis.

Nurses holding a master's degree or higher reported the lowest average communication self-efficacy and job satisfaction scores during the COVID-19 epidemic. However, there are no specific studies that provide positive or negative

results regarding this finding. Nevertheless, there are several studies that have investigated factors affecting job satisfaction and burnout among nurses. For example, one study found that job satisfaction was positively related to professional commitment among nursing students during the COVID-19 lockdown [24]. Another study found that job satisfaction was negatively affected by toxic leadership practices among nurses [25]. In addition, a study found that burnout among nurses was related to their level of self-efficacy and job satisfaction [26]. It is important to consider factors such as job satisfaction, self-efficacy, and leadership practices when addressing the well-being of nurses during the COVID-19 pandemic [24–26].

The results indicate that nurses working exclusively in the morning shift reported the highest average JS.C score. Several studies have investigated the effect of shift work on the job satisfaction of nurses. One study conducted in Pakistan found that nurses working rotating shift duties reported lower job satisfaction than those working day shifts [27]. Another study conducted in Italy found that nurses working rotating night shifts reported the lowest mean score in job satisfaction compared to those working day shifts [28]. The available evidence suggests that shift work, particularly rotating night shifts, can have a negative impact on the job satisfaction of nurses. More research is needed to fully understand the relationship between shift work and job satisfaction among nurses during the COVID-19 pandemic.

The results indicated a statistically significant correlation between age and CSE.C. Lim et al. in their study indicated that significantly nurses aged 50 years or more have high self-efficacy [10]. Also, Mehralian et al. in their study on 312 nurses working in a COVID-19 hospital in the south of Iran; they also reached a similar conclusion [29]. Therefore, it can be concluded that age is one of the important factors in nurses' self-efficacy against COVID-19. Older nurses show greater self-efficacy against this disease. This issue can be considered as one of the important components in the planning and management of human resources in the field of nursing.

Finally, the relationship between sociodemographic characteristics of nurses and their self-efficacy and job satisfaction appears to be complex and multifactorial. It is important for nursing managers to consider these factors and construct a monitoring system to reduce negative outcomes and improve job satisfaction and self-efficacy among nurses.

4.1.2. Nurses' Communication Self-Efficacy during the COVID-19 Epidemic. The study findings revealed that the highest average response of the participants to the CSE.C questions was obtained in relation to the question "in any situation, especially critical situations such as caring for a COVID-19 patient, how confident are you in coordinating your duties with the team?" Based on the search results, there is limited information on the confidence of nurses in their ability to perform teamwork in critical situations such as taking care of a COVID-19 patient. However, there are studies that explore the influence of management modes on

TABLE 3: The maximum and minimum average response of the participants to the CSE.C and JS.C questions.

Instrument	Questions	Scores	Mean \pm SD
CSE.C	(i) In any situation, especially critical situations such as caring for a COVID-19 patient, how confident are you in coordinating your duties with the team	Maximum	7.96 \pm 1.93
	(ii) How sure are you that you are successful and capable in preparing a preprepared conversation plan with the patient of COVID-19?	Minimum	6.33 \pm 2.42
JS.C	(i) I am satisfied with my ability to influence quality nursing care of patients	Maximum	4.85 \pm 1.01
	(ii) The salary and benefits received are proportional to the volume and difficulty of my work	Minimum	1.80 \pm 1.33

TABLE 4: Correlation coefficients between research variables ($n = 500$).

Variables	CSE.C	
	r	P
(1) Age	0.094	0.036*
(2) Work shift	0.090	0.045*
(3) JS.C	0.254	0.000**

**Correlation is significant at the 0.01 level (2 tailed). *Correlation is significant at the 0.05 level (2 tailed).

the teamwork ability of nurses [30]. In addition, newly graduated registered nurses working in acute care hospital settings play a critical role in providing safe nursing care, and teamwork is essential in reducing preventable errors and improving safety outcomes [31]. While there is limited information on the confidence of nurses in their ability to perform teamwork in critical situations such as taking care of a COVID-19 patient, teamwork is essential in providing safe nursing care and reducing preventable errors.

The lowest average response of the participants to the communication CSE.C was obtained in relation to the question “how confident are you in your ability to successfully prepare and conduct a preprepared conversation plan with a COVID-19 patient?” There is limited evidence available on nurses’ confidence in developing a conversation plan for critical situations in general. However, some studies have explored the impact of the COVID-19 pandemic on communication in clinical settings and the use of communication strategies in online teaching and learning during the pandemic. Communication was slightly affected during the pandemic, especially nonverbal communication, with verbal communication maintained and, in some cases, strengthened [32]. In terms of end-of-life care planning, the use of the Supportive and Palliative Care Indicators Tool (SPICT) for hospital admissions and the application of education in topics related to end-of-life care resulted in a significant improvement in renal nurses’ perception of confidence in their ability to recognize end of life [33]. While there is limited information available on nurses’ confidence in developing a conversation plan for critical situations in general, studies have explored the impact of the COVID-19 pandemic on communication in clinical settings and the use of communication strategies in online teaching and learning during the pandemic. In addition, studies have explored the use of tools such as SPICT to improve nurses’ confidence in recognizing end-of-life care needs.

4.1.3. Nurses’ Job Satisfaction during the COVID-19 Epidemic. The highest average response of the participants to the JS.C questions was obtained in relation to the question “I am satisfied with my ability to influence quality nursing care of patients?” A study conducted in Quebec, Canada, found that nurses caring for COVID-19 patients reported high chronic fatigue, poor quality of care, lower work satisfaction, and higher intention to leave their organization [34]. However, another study found that nurse-led multidisciplinary team care, training, and development, appropriate skill mix, quality, and outcome of care can lead to improved nurse-patient relationships and increased satisfaction with the quality of care provided [35]. Effective communication and support for nurses are crucial in providing quality care to COVID-19 patients. It is also important to address concerns about nurse-led care and provide evidence regarding patient safety, clinical outcomes, cost, and patient satisfaction to reflect on the ability of nurses to provide high-quality care within the primary care setting [36].

The lowest average response of the nurses to the JS.C questions was obtained in relation to the question “the salary and benefits received are proportional to the volume and difficulty of my work during the COVID-19 pandemic.” One study found that financial factors, such as monthly salary or bonuses, had no or little impact on work motivation during the pandemic [37]. It appears that the impact of COVID-19 on nurse salaries and benefits is complex and multifaceted, with various factors affecting compensation and job satisfaction. This emphasizes the importance of nursing organizations playing an active role in advocating for the profession and ensuring that nurses’ voices are appreciated in the healthcare system.

4.1.4. Correlation Relationship between CSE.C and JS.C.

The correlation results showed a positive and significant relationship between CSE.C and JS.C in the nurses under study. The results of studies conducted on employees of different jobs showed that self-efficacy is one of the factors affecting job satisfaction [12, 38–40]. Similar results were obtained in the studies of Klassen et al. on 1430 Canadian teachers [41], and Darvish et al. on 100 Tabrizi-Iranian nurses [42]. People who believe in their abilities act well in the face of challenging situations, which will make them feel productive and increase their job satisfaction. Nurse self-efficacy is a key factor in how to care the patient and his job satisfaction. The nurse’s performance during stressful situations such as the COVID-19 epidemic may overshadow the

individual's self-efficacy. A reasonable understanding of the consequences of COVID-19 in nurses and anticipation of possible measures to deal with these consequences is important in their effective management [3].

4.2. Practical Implications. The results of this current study can furnish substantial evidence for nursing managers, decision-makers, and policymakers in the nursing field, augmenting their knowledge of the factors that influence nurses' communication self-efficacy and job satisfaction. Moreover, this study can serve as a commendable initial step towards designing and implementing programs aimed at enhancing nurses' communication self-efficacy and job satisfaction. In addition, as this study was conducted during the COVID-19 pandemic, its outcomes can provide a reliable benchmark for future research, both during and after critical situations and for studies conducted under normal and non-critical circumstances.

4.3. Limitations and Future Research. To increase the generalizability of the results, future research should be improved with a more balanced mix of male and female nurses. Also, the tool used in this study was a self-report questionnaire that could potentially impair data quality due to social desirability. Despite the limitations, in the present study, two questionnaires of self-efficacy and job satisfaction were developed during COVID-19 and, according to their validity and reliability, can be used in similar epidemics.

5. Conclusions

The relationship between sociodemographic factors and nurses' self-efficacy and job satisfaction is complex and multifactorial. Therefore, nursing managers need to take these factors into account and establish a monitoring system to improve job satisfaction and self-efficacy among nurses. In addition, factors such as widowhood, divorce, shift work, and communication strategies can affect nurses' job satisfaction and self-efficacy during the COVID-19 pandemic. Furthermore, nursing organizations need to advocate for the profession and ensure that nurses' voices are heard in the healthcare system. Finally, the age of nurses appears to be an important factor in their self-efficacy against COVID-19, with older nurses showing greater self-efficacy. This finding can be considered in the planning and management of human resources in the nursing field. Overall, an understanding of the complex factors affecting nurses' job satisfaction and self-efficacy is crucial for effective management and care during the COVID-19 pandemic.

Data Availability

The data used to support the findings of this study may be released upon application to the Department of Health Education and Health Promotion, who can be contacted at healthpromotion.sums@gmail.com.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

The Coping Strategies and Cumulative Changes in Intensive Care Unit Nurses after Experiencing Professional Grief: A Hermeneutic Phenomenological Study

Zhengmin Zhang ^{1,2}, Manyi Gao ³, Zejian Fang ¹, Xin Chen ¹, Qiaoqiao Shen ¹,
and Yulin Gao ¹

¹School of Nursing, Southern Medical University, Guangzhou, Guangdong, China

²Guangdong Mechanical & Electronical Polytechnic, Gaungzhou, Gaungdong, China

³School of Chinese Medicine, Southern Medical University, Guangzhou, Guangdong, China

Correspondence should be addressed to Qiaoqiao Shen; shenqiaoqiao@smu.edu.cn and Yulin Gao; gyl@smu.edu.cn

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Background. Compared to nurses in other hospital departments, intensive care unit (ICU) nurses have more frequent exposure to patient deaths, potentially rendering them more susceptible to experiencing professional grief following patient fatalities. **Objective.** To explore the coping experiences of ICU nurses following their encounter with professional grief. **Methods.** This study utilized a qualitative research design based on Heideggerian phenomenology. A purposive sample of 18 ICU nurses was selected from six tertiary hospitals in Guangdong Province, China. Individual semistructured interviews were audio-recorded and transcribed verbatim. The transcribed texts were analyzed using interpretative phenomenological analysis. **Results.** Two main themes emerged: (1) short-term dual coping with professional grief and (2) long-term cumulative changes from professional grief. These themes reflect the dynamic coping processes experienced by ICU nurses amidst frequent encounters with loss and grief during their clinical work. **Conclusions.** ICU nurses employ both adaptive and maladaptive coping strategies to address professional grief, significantly impacting their personal and professional well-being. It is advisable to offer targeted education and organizational support systems for ICU nurses to promote positive cumulative growth when they repeatedly encounter patient deaths.

1. Introduction

Professional grief, within the healthcare context, refers to the emotional distress experienced by healthcare practitioners following patient deaths during clinical practice [1]. This distress often presents with symptoms such as sadness, self-blame, insomnia, decreased appetite, and intrusive thoughts about death [1]. Due to the unique nature of the relationship between healthcare professionals and patients, the professional grief they undergo, distinct from familial grief, is often characterized as disenfranchised grief—not widely recognized or accepted by the general public [2]. Data from the Societies of Intensive and Critical Care reveal that the

global average mortality rate for intensive care unit (ICU) inpatients falls within the range of 10% to 29% [3]. Compared to their counterparts in other hospital departments, ICU nurses are more frequently exposed to patient deaths, making them more susceptible to experiencing professional grief [4].

Existing research emphasizes the inevitability and prevalence of professional grief among healthcare professionals [1, 4]. For example, Papadatou et al. [5] conducted semistructured interviews with 63 oncology and ICU nurses caring for terminally ill children in Greece and Hong Kong, revealing that 93% of nurses had experienced grief following patient deaths. Faced with professional grief, many

healthcare professionals resort to maladaptive coping strategies, such as avoiding direct exposure to death and death-related environments [6, 7], evading communication with patients' families [6, 7], and turning to substance abuse to manage psychological stress [8]. While some studies investigate adaptive coping mechanisms employed by healthcare professionals in professional grief, such as openly expressing their emotions [9, 10], engaging in recreational activities [7, 10], or seeking support from family [7, 9, 10], these studies lack an in-depth exploration of the psychological coping mechanisms used by healthcare professionals in professional grief and the potential long-term impacts on their personal and professional lives.

To date, the majority of research on professional grief among nurses has been concentrated in Europe and North America, with relatively limited participation from non-Western regions [1]. In China, the nursing profession faces challenges such as low societal recognition, demanding workloads, and strained nurse-patient interactions [11]. Consequently, the professional grief experienced by nurses is often marginalized or inadequately addressed [10]. This study employed a phenomenological research approach with the aim of comprehensively analyzing the coping experiences of Chinese ICU nurses in the face of professional grief. The goal is to enhance the conceptual model of professional grief among healthcare professionals in a cross-cultural context and facilitate managers in devising intervention strategies to address professional grief.

2. Methods

2.1. Study Design. This phenomenological study was conducted within the hermeneutic paradigm proposed by the German philosopher Martin Heidegger (1889–1976) [12]. Heidegger's perspectives primarily focus on elucidating the essence of existence, emphasizing an understanding of the modes of existence and the intrinsic meaning of existence itself, rather than solely concentrating on the surface phenomena of objects [13]. To facilitate operational procedures, we employed Jonathan A. Smith's developed method known as the Interpretative Phenomenological Analysis (IPA) framework [14]. The reporting of this study adhered to the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist [15].

2.2. Study Participants. From October 2020 to May 2021, ICU nurses were recruited through purposive sampling from six tertiary hospitals in Guangdong Province, China. Inclusion criteria comprised possessing a valid nursing license, a minimum of 6 months of ICU experience, and previous exposure to patient deaths. Exclusion criteria included refusal to participate in the study, being on vacation, and the presence of severe physical or mental illnesses. IPA research involves a meticulous analysis of cases, typically conducted within a small sample size of around 10 cases [14]. Smith et al. also suggested that determining the sample size should be pragmatic, considering the depth and breadth of the study, rather than adhering to fixed standards [16].

Following the fundamental principle of "data saturation" [17], researchers conducted in-depth interviews with 12 ICU nurses from a single hospital. Subsequently, interviews were extended to include 6 ICU nurses from five additional hospitals, concluding recruitment upon confirmation that no new themes or codes emerged.

2.3. Data Collection. The first and second authors conducted individual face-to-face interviews with participants in a quiet lounge after their work hours. The interview guide, developed through a literature review, expert consultation, and pilot interviews with four ICU nurses, included the following questions: (1) Could you share your most memorable experience involving a deceased patient during your ICU work? (2) What internal feelings arise when confronted with patient deaths? (3) Have you employed strategies to alleviate these feelings, and how effective were they? (4) When saddened by a patient's passing, what support mechanisms are available to you? (5) How have your reactions and coping strategies evolved since your initial encounter with patient deaths? The interviews varied in duration from 42 to 96 minutes, with an average interview time of 58 minutes. All interviews were recorded and transcribed verbatim. Both interviewers meticulously reviewed the transcripts for accuracy, providing interviewees with the opportunity to verify and validate their statements.

2.4. Data Analysis. The analytical process was subjected to IPA, wherein a meticulous idiographic analysis was prioritized on a case-by-case basis, followed by the exploration of patterns across cases [16]. Following the six-stage process outlined in the IPA research guidelines [14], each complete transcript was thoroughly and repeatedly read line-by-line, annotated to develop emergent themes and explore connections between emerging themes. This process was iteratively applied to review all remaining cases, identifying patterns across cases and determining themes and sub-themes reflecting the experiences of all participants. The first author led the analysis, with each step reviewed and verified by the corresponding authors. The final analysis underwent scrutiny by all other team members, ensuring consensus on the overall interpretation of interviews and contributing to the ultimate findings. NVivo version 12.0 was utilized for data management and analysis assistance.

2.5. Trustworthiness/Credibility. The first author, who has previously interned in the ICU, established positive relationships with participants, facilitating the sharing of sensitive experiences related to professional grief. Before formal interviews, researchers extensively practiced using the interview guide and conducted pilot interviews to refine their interview skills. Both the first author and corresponding authors received standardized training, possessed rich qualitative research experience, and employed a systematic approach to iteratively analyze transcripts. Throughout the analysis process, researchers engaged in continuous self-reflection, questioning data, and existing

knowledge to ensure the validity of interpretations without undue stretching or overinterpretation. In addition, they actively sought review and validation from team members and participants to ensure the accuracy and reliability of the study results.

2.6. Ethical Considerations. The study received ethical approval from the Southern Medical University Ethics Committee (No. 2020–16). Participants were informed about the study's purpose and gave written informed consent. Participant identities are anonymized using numerical codes. Audio recordings and transcribed data are securely stored in password-protected files, accessible only to research team members.

3. Results

3.1. Participant Characteristics. A total of 18 ICU nurses, comprising nine males and nine females, participated in this study. The participants' ages ranged from 23.0 to 37.0 years (mean age of 30.0 years), and their average tenure in ICU nursing was 7.3 years. Among the participants, 4 were supervisor nurses, and 1 held a master's degree. None of the participants reported having any religious beliefs, and none had received professional training related to grief adjustment. The characteristics of the participants are presented in Table 1.

3.2. Emerging Themes and Subthemes. The coping experiences of ICU nurses with professional grief were identified as two themes, comprising six subthemes and 42 codes. The results are presented in Table 2.

3.2.1. Short-Term Dual Coping with Professional Grief

(1) Avoidance of Death and Confrontation with Death. For the majority of ICU nurses, the experience of encountering patient deaths was a significantly stressful event. Consequently, they often chose to avoid direct contact with dying or deceased patients, refrained from interacting with patient families during mourning scenes and sidestepped discussions regarding patient death.

N4: "My main focus was on the medical condition, and I preferred not to delve into discussions about information connected to patient death."

N8: "I didn't want patients to pass away while I was on duty. If I could hand over the shift to someone else, it was a relief."

N15: "I chose to avoid, trying not to hear the cries of the family members."

In contrast, some nurses attempted to derive meaning from patient deaths by rationalizing them as liberation, finding solace in destiny-based explanations for death, or believing themselves to have fulfilled their caregiving

responsibilities. Moreover, a few nurses chose to bid farewell to deceased patients, accompanying them through their final moments as a means of completing the mourning process.

N1: "He's finally at peace, no more suffering."

N7: "I just stood there silently, watching her, accompanying her through the final moments of her life..."

N13: "Everyone has their own fate; you have to believe in it."

N18: "I feel like I have a clear conscience; I've provided the best care to the patient."

(2) Psychological Detachment and Psychological Adjustment. Three nurses reported proactively disengaging from their duties and taking a break in the relaxation area after completing postmortem care. Simultaneously, the majority of ICU nurses actively disengaged from work after their shifts, deliberately avoiding contemplation of work-related matters to prevent further interference with feelings of grief.

N3: "when I'm off duty, I don't want to bring these emotions home."

N16: "As I left the ward environment and entered the living area, I gradually underwent a process of detachment."

Nevertheless, participants also recognized that, at times, they faced challenges in completely disengaging from the negative emotions associated with patient deaths. In these instances, they made efforts to mitigate their grief through distraction techniques, including engaging in conversations, participating in leisure activities, or indulging in retail therapy.

N12: "I tried chatting with colleagues or doing something else, just to quickly divert my attention."

N13: "I went for walks, watched movies, and did some shopping, all just to forget about these things."

(3) Social Withdrawal and Support Seeking. After experiencing the death of a patient, some ICU nurses exhibited a strong desire for solitude. They temporarily withdrew from social and recreational activities, declined unnecessary interactions with others, and lost interest in the external world.

N2: "The entire world seemed gray; I became quieter. Even when I walked on the street after work, I didn't want to look around."

N6: "I didn't feel like talking; I just wanted to find a quiet place to be alone, and it was better if others didn't bother me."

ICU nurses had often attempted to seek support from colleagues and family members to express or release their own grief. However, this support sometimes remained on

TABLE 1: Characteristics of study participants ($n = 18$).

Number	Gender	Age, years	Employment duration in the ICU, years	Positional title	Educational background	Marital status	Psychological acceptance of patient deaths
N1	Female	31	5	Senior nurse	College degree	Unmarried	Moderate
N2	Female	24	2	Registered nurse	College degree	Unmarried	Moderate
N3	Male	30	8	Senior nurse	Bachelor's degree	Married	Unacceptable
N4	Male	32	8	Senior nurse	College degree	Married	Somewhat acceptable
N5	Female	25	4	Registered nurse	College degree	Unmarried	Somewhat acceptable
N6	Female	36	16	Senior nurse	Bachelor's degree	Married	Moderate
N7	Male	37	14	Nurse supervisor	College degree	Unmarried	Moderate
N8	Female	28	8	Supervisor nurse	Bachelor's degree	Married	Moderate
N9	Female	27	1	Senior nurse	College degree	Married	Moderate
N10	Female	37	13	Senior nurse	College degree	Married	Somewhat acceptable
N11	Male	32	11	Senior nurse	Bachelor's degree	Married	Somewhat acceptable
N12	Female	35	14	Supervisor nurse	Bachelor's degree	Married	Moderate
N13	Male	23	3	Registered nurse	College degree	Unmarried	Somewhat acceptable
N14	Male	25	3	Registered nurse	College degree	Unmarried	Moderate
N15	Male	28	4	Registered nurse	Bachelor's degree	Unmarried	Moderate
N16	Female	34	10	Supervisor nurse	Master's degree	Married	Moderate
N17	Male	27	2	Registered nurse	Bachelor's degree	Unmarried	Somewhat acceptable
N18	Male	29	6	Senior nurse	Bachelor's degree	Unmarried	Moderate

TABLE 2: Themes, subthemes, and codes.

Themes	Subthemes	Codes
Short-term dual coping with professional grief	Avoidance of death and confrontation with death	(i) Avoidance of deceased patients/avoidance of dying patients/avoidance of patient families/avoidance of mourning scenes/avoidance of discussions on death (ii) Patient's relief from suffering/family's relief from distress (iii) Fate's interpretation (iv) Clear conscience/voluntary farewell/voluntary mourning
	Psychological detachment and psychological adjustment	(i) Maintaining distance from work/forgetting work-related matters/taking a short break (ii) Relaxing oneself/shifting attention
	Social withdrawal and support seeking	(i) Self-isolation/diminished interest (ii) Family support/friend support/colleague support/leadership support
	Cherishing life and existential meaningfulness	(i) Valuing health/valuing quality of life/changing priorities/enjoying the present/spending time with family (ii) Worthlessness of life/meaninglessness of life/lack of life goals
Long-term cumulative changes from professional grief	Emotional resilience and emotional exhaustion	(i) Familiar situation/inner calmness/rapid adjustment (ii) Emotional numbness/empathic fatigue/emotional absence
	Professional development and occupational burnout	(i) Medical knowledge and skills/end-of-life care/grief counseling (ii) Depersonalization/reduced accomplishment/intentions to leave

the surface, and inappropriate consolation or less-than-ideal reactions left ICU nurses feeling isolated.

N6: *"I used to talk to my mom when I first started working, but later she said, 'Why is your department so scary?' so I stopped talking to her about it."*

N11: *"I talked to the head nurse about my fears, and she said, 'You'll get used to it after seeing it more.'"*

3.2.2. Long-Term Cumulative Changes from Professional Grief

(1) *Cherishing Life and Existential Meaninglessness.* ICU nurses transitioned from initial anxiety about death to valuing health, embracing the present moment, and cherishing relationships with loved ones. This transformation reflects an awakening derived from their experiences of grief. They also contemplated their own death, desiring to make rational end-of-life arrangements for the future, leading towards a death with a high quality of life.

N1: *"Having witnessed patient deaths, I now understand the importance of being there for family."*

N9: *"Taking care of my health, living each day to the fullest; who knows what the future holds? If I have a choice, I hope not to experience too much pain at the end of life."*

Some nurses had witnessed numerous patients teetering on the edge of life and death, eventually succumbing to their fate, leading to nurses feeling a profound sense of helplessness. Faced with the fragility and unpredictability of life, these nurses engaged in deep reflections on the meaning and value of existence. This contemplation led these nurses to adopt the conviction that life is transient, potentially causing them to lose sight of life goals and perhaps slipping into a sense of existential nihilism.

N8: *"Life is so difficult, and I don't even know what people are living for."*

N10: *"I feel like there are not many joyful things in life, and I don't want to strive for a lot of things; it doesn't seem meaningful."*

(2) *Emotional Resilience and Emotional Exhaustion.* Most ICU nurses indicated that, after repeatedly experiencing patient deaths in their work, their emotions were not as profoundly affected as when they first started. They were able to quickly adjust their emotions within a short period.

N3: *"After putting in years on the job, I've gotten pretty good at handling my emotions on my own. It's been working out quite well."*

N18: *"Back in the day, it used to take me over two weeks to shake off a bad mood, but these days, I can bounce back right after wrapping up my shift."*

Moreover, several interviewees mentioned encountering emotional fatigue in the face of patient deaths. They exhibited a reduced sense of empathy towards the families of patients, experienced a decline in the intensity of professional grief, or even reported a complete absence of such feelings.

N5: *"The deaths of patients don't affect me as much anymore; I recognize that they're reaching the end, and I don't experience strong emotions about it."*

N9: *"Having witnessed numerous resuscitations and gone through so many, I've developed emotional numbness."*

(3) *Professional Development and Occupational Burnout.* Most ICU nurses drew lessons from cases of patient deaths, focusing on enhancing their professional skills to effectively handle similar medical situations. They also reflected on their inadequate abilities in end-of-life care and grief counseling but strove to maintain the dignity of patients and fulfill the requests of grieving families to the best of their ability.

N8: *"In most cases, we find ourselves at a loss for words when facing family members... striving to fulfill their wishes to the best of our ability."*

N17: *"(Reflecting on a patient's death) The challenges in these situations force me to grow up fast; I become more careful and detailed in observing the medical condition."*

In the busy environment of the ICU, nurses often found themselves too occupied to attend to their own grief. As a result, they intentionally maintained emotional distance from patients, mechanically adhering to established caregiving procedures. In addition, nurses expressed an inclination to transition to departments with reduced exposure to patient deaths or to consider leaving the nursing profession altogether.

N1: *"I feel like I'm being a robot, going through the same process day after day, taking care of one patient, and then the next, in a repetitive cycle."*

N10: *"After working in the ICU for a long time, I want to change the work environment, dealing with patients who can move and speak."*

4. Discussion

4.1. *Main Findings.* To the best of our knowledge, this is the first qualitative research conducted in mainland China that specifically investigates the professional grief experienced by ICU nurses. Our research synthesizes the dual coping strategies employed by ICU nurses within the Chinese cultural context, focusing on dealing with death, psychological adjustment, and external support. In addition, our findings highlight the cumulative impact of professional grief on both the personal and professional

lives of ICU nurses, addressing the scarcity of evidence regarding ICU nurse professional grief in non-Western regions [1].

4.2. Comparing Study Findings with Relevant Professional Grief Models. In this study, ICU nurses commonly experienced grief due to patient deaths and employed various adaptive coping mechanisms, such as rationalizing death, bidding farewell proactively, and psychological detachment. Some nurses, however, tended to adopt maladaptive coping strategies, including death avoidance and social withdrawal, in response to professional grief, aligning with the Model of Health Professionals' Grieving Process proposed by Papadatou [18]. Nevertheless, in contrast to this model, we argue that the construction of meaning around patient death and behaviors like self-adjustment and seeking support are coping strategies for professional grief, rather than outcomes of the grieving process or consciously completed tasks. Furthermore, the cumulative effects of repeated encounters with professional grief, whether positive or negative, align with the Professional Grief Integration Model by Chen et al. [1], where the cumulative experiences of multiple patient deaths eventually have long-term personal and professional consequences for healthcare providers. In our study, while discerning shifts in the perspectives of ICU nurses on life and death, there is minimal discourse regarding transformations linked to religious beliefs. In contrast to Western nations, the religious ambiance in Chinese society is relatively subdued [10]. Embedded within traditional Chinese culture is the notion that "life and death are predestined, and wealth and poverty are heaven's arrangement," significantly influencing individuals' attitudes towards life and death [10]. This inclination tends to foster a preference for embracing reality over seeking solace through religious faith.

4.3. ICU Nurses Lacking Support to Cope with Professional Grief. After experiencing patient deaths, ICU nurses frequently found themselves confronted with a shortage of adequate professional resources to cope with their grief—a situation pervasive in many healthcare systems [6, 19]. In response, they often resorted to employing self-distraction strategies, suppressing their grief and emotions to fulfill their professional duties [20]. While this self-protective mechanism may offer some short-term relief, the accumulation of unaddressed grief over time poses the risk of leading to professional grief overload among ICU nurses [21]. Despite their attempts to confide in colleagues or family members for support, the cultural taboo surrounding death often stigmatizes discussions about mortality and grief, deeming them as inauspicious or inappropriate topics [10]. This, in turn, leaves nurses feeling isolated and helpless, deprived of the emotional support they urgently require [10]. In light of these challenges, it becomes imperative for healthcare institutions to prioritize the monitoring of the emotional well-being and psychological state of ICU nurses and to provide resources and channels that facilitate professional grief relief for them [21].

4.4. ICU Nurses Undergoing Negative Cumulative Changes from Professional Grief. This study revealed that ICU nurses, when exposed to prolonged instances of patient deaths, tended to experience emotional exhaustion and a decline in empathy towards both patients and their families. Some ICU nurses adopted a strategy of limiting emotional involvement, delivering care in a more mechanical manner to alleviate professional grief. While this approach can mitigate professional grief to some extent, it may lead to an insufficient provision of humanistic care for patients and their families, a decrease in nursing quality, and diminished job satisfaction among ICU nurses, ultimately resulting in a loss of nursing talent [22]. Our research found that these adverse cumulative changes were notably influenced by maladaptive coping strategies employed by ICU nurses in the face of patient deaths. Conversely, adaptive coping strategies resulted in a positive perspective on life and death, improved interpersonal relationships, and significantly enhanced self-emotional regulation abilities. Therefore, it is crucial to acknowledge the emotional shifts and psychological states experienced by ICU nurses, especially those with limited experience [23], and guide them in redefining the meaning of life and death through their losses and fostering personal reflection and growth.

4.5. Study Limitations. This study has several limitations. First, being a phenomenological study, our objective is exploratory rather than confirmatory, delving into the in-depth examination of grief coping experiences among ICU nurses—experiences that often go unnoticed. To ascertain variations in their professional grief coping and its evolutionary processes, further investigation with a larger sample of ICU nurses is imperative. Second, the researchers, serving as the investigative tool, may introduce interviewer bias. To ensure credibility, we engaged in self-reflection, avoiding the impact of a priori assumptions, and employed the triangulation method for data collection and analysis [24]. Third, although interviews were conducted in 2021, data analysis was not completed until 2023, potentially resulting in a lag in data information. Fourth, our interviews took place during the COVID-19 pandemic. During this unique period, strict infection control measures were in place, and healthcare professionals experienced increased workloads. These factors may have affected participants' availability and psychological resilience, potentially making them feel more stressed or fatigued during the study. Finally, our study was conducted exclusively in Guangdong Province, China. While our findings align closely with research on healthcare professionals' professional grief in other regions, caution should be exercised when generalizing the results.

5. Conclusion

In summary, ICU nurses employ adaptive or maladaptive strategies to navigate professional grief, resulting in subsequent positive or negative cumulative changes in both their personal and professional lives. It is imperative to guide ICU nurses in recognizing and expressing their professional

grief, provide formal organizational support, and offer professional psychological counseling to promote their adaptive coping and personal growth. Further research with larger sample sizes and across multiple regions is recommended to develop and evaluate interventions facilitating ICU nurses' coping with grief when confronted with patient death.

Data Availability

The datasets analyzed during the current study are not publicly available due to privacy issues of participants but are available from the corresponding author on reasonable request.

Disclosure

The funders had no involvement in the study design, data collection and analysis, manuscript preparation, or decision to publish.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' Contributions

Zhengmin Zhang conceptualized the study, performed data curation, proposed the methodology, conducted interview data acquisition, analyzed the study, wrote the original draft, and reviewed and edited the manuscript. Manyi Gao was responsible for interview data acquisition, proposed the methodology, analyzed the study, and reviewed and edited the manuscript. Zejian Fang and Xin Chen analyzed the study and reviewed and edited the manuscript. Qiaoqiao Shen conceptualized the study, proposed the methodology, analyzed the study, wrote the original draft, and reviewed and edited the manuscript. Yulin Gao performed project administration, provided resources, proposed the methodology, analyzed the study, and reviewed and edited the manuscript. Zhengmin Zhang and Manyi Gao contributed equally to the work and should be recognized as co-first authors. Likewise, Yulin Gao and Qiaoqiao Shen contributed equally to the work and should be regarded as co-corresponding authors.

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Research Article

Critical Care Nurses' Perception of Medication Administration Errors in Kelantan, Malaysia: A Cross-Sectional Study

Muhammad Solehuddin Ishak  and Mohd Ismail Ibrahim 

Department of Community Medicine, School of Medical Sciences, Universiti Sains Malaysia, Kubang Kerian 16150, Kota Bharu, Kelantan, Malaysia

Correspondence should be addressed to Mohd Ismail Ibrahim; ismaildr@usm.my

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Background. The study investigates critical care nurses' perceptions of medication administration errors (MAEs) in a tertiary hospital in Kelantan, Malaysia, within the unique sociocultural context of East-Coast Malaysia. The research aims to understand the causes and underreporting of MAEs and assess the proportion of reported incidents according to MAE types. **Methods.** A cross-sectional study involving 424 critical care nurses from Hospital Raja Perempuan Zainab II (HRPZII), Hospital Sultan Ismail Petra (HSIP), and Hospital Tanah Merah (HTM) was conducted. Nurses in administrative roles or unavailable during the survey period were excluded. The study utilized a validated Medication Administration Errors Survey questionnaire to gauge nurses' perceptions on the causes of MAEs, reasons for underreporting, and the percentage of reported incidents based on MAE types. **Results.** Results indicate that illegible medication orders from doctors were identified as the primary cause of MAEs, while a lack of 24-hour pharmacist availability received the lowest score. The most common reason for not reporting MAEs was identified as the nursing administration's focus on individuals rather than systemic issues when errors occur. The majority of MAEs were non-intravenous, with incorrect timing of administration being the leading cause. **Conclusion.** The study sheds light on critical care nurses' perspectives on MAEs in a Malaysian hospital setting, highlighting key factors contributing to these errors and barriers to their reporting. Understanding these perceptions is crucial for developing strategies to mitigate MAEs and enhance patient safety in critical care environments.

1. Background

Medication administration errors (MAEs) are defined as “a deviation from the prescriber's medication order as written on the patient's chart, manufacturers' preparation/administration instructions, or relevant institutional policies” [1]. MAEs are a major concern in the nursing sector, resulting from inconsistencies between the medication delivered to patients and the intended medical therapy prescribed by healthcare practitioners [2]. In the United States alone, drug-related incidents kill between 7,000 and 9,000 people each year [3]. Medication errors can have serious consequences, such as increased patient mortality, extended hospitalization times, and increased medical costs [4–6]. Medication errors are predicted to cost the world USD 42 billion per year [7].

The major reason for reporting such errors was concern about patient safety [8]. The goals of World Patient Safety Day are to educate the public, motivate action, and encourage governments to prioritize patient safety in health-care systems worldwide. On September 17, 2022, World Patient Safety Day was honored with the theme “Medication Safety,” highlighting the necessity of ensuring that medications are safe for patients to use [9]. The program aimed to eliminate unnecessary adverse drug reactions by consolidating the World Health Organization's Global Patient Safety Challenge: Medication without Harm [10].

The five “rights” linked with the safe and effective administration of medicines are the “right patient,” “right medication,” “right time,” “right dose,” and “right route.” Errors when delivering medications to patients often violate

one or more of these rights [11]. The five “rights” have been firmly established in nursing education as standard guidelines for ensuring safe and effective medication delivery. However, new study has highlighted the concept that medication administration is merely one component of a larger and more complex pharmaceutical utilization process [3, 12]. As a result, four new “rights” were proposed: right documentation, right action/reason, right form, and right reaction [13]. Medication errors are more common in high-volume care settings including emergency rooms and intensive care units [14].

The fear of experiencing negative consequences associated with reporting and undergoing disciplinary actions, the fear of being held accountable, the fear of the response from nurse management and colleagues, and the fear of job loss all influence nurses’ attitudes toward reporting medication errors [15]. The act of reporting medication errors is critical to properly resolving these situations because it facilitates knowledge learning among healthcare personnel and raises medication safety awareness [16]. Multiple factors, including insufficient professional experience, participation in night shifts, poor on-the-job training, the absence of preestablished protocols for medicine administration, and interruptions during administration procedures, have shown statistically significant relationships with medication administration errors [17]. Medication errors are more likely in the context of intravenous therapy [18].

Nurses spend 40% of their time on medication administration, making them crucial in the healthcare system as the last checkpoint before giving medications. Nurses need to detect and correct errors in keeping with their professional, legal, and ethical responsibilities [19]. The ongoing concern about medical delivery errors remains a significant feature in the goal of patient safety [13]. Identifying a persistent root cause of errors and subsequently devising a good solution that significantly minimizes the likelihood of their recurrence is a substantial and tough challenge [3].

Nurses play an important role in facilitating medication administration to patients in the hospital setting [20]. The study setting still relies on conventional paper-based methods for prescription of the medications. Nurses in critical care units at a tertiary hospital in East-Coast Malaysia are likely to speak Malay at home and at work [21]; this study aims to learn their perspectives on the factors that lead to MAEs and why some of them choose not to report them. In order to fulfil healthcare needs, Malaysia uses both locally branded medications and medications imported from other nations, such as Pfizer, as per the National Pharmaceutical Regulatory Agency (NPRA) [22]. Because of the scarcity of local study on MAEs among nurses, the current study takes advantage of this information gap. As a result, the study’s objectives are to assess critical care nurses’ perceptions of the causes of MAEs and the reasons for not reporting MAEs, as well as the percentage of reported non-intravenous and intravenous-related MAEs.

2. Materials and Methods

2.1. Study Design and Participants. Over a period of two months beginning in February 2023, a cross-sectional survey was undertaken among critical care nurses registered and employed at tertiary institutions in Kelantan, Malaysia. The study involved three tertiary hospitals: Hospital Raja Perempuan Zainab 2 (HRPZII), Hospital Sultan Ismail Petra (HSIP), and Hospital Tanah Merah (HTM).

The sample size was calculated using a single mean calculation according to study conducted by You et al. [23]. The lists of critical care nurses were obtained from the nursing units of each hospital. The participants were chosen at random in proportion to the quantity of nurses available during the study. There were 424 critical care nurses in all, including 276 from HRPZII, 121 from HSIP, and 27 from HTM. The inclusion criteria for this study consisted of registered nurses who were directly involved in providing patient care and had a minimum employment duration of six months at each unit. Additionally, in order to keep our emphasis on evaluating staff who interact directly with patient care, we purposefully eliminated administrative roles, nurses who were not present during the survey, and nurses who did not provide direct patient care from our consideration.

2.2. Measuring Tool. The Medication Administration Errors Survey, a self-reported questionnaire created by Wakefield et al., was used to assess nurses’ perceptions of MAEs [24]. The questionnaire was approved for use prior to the study’s conduct. It was confirmed, and Cronbach’s alpha value was 0.78. The surveys were divided into three sections: 28 questions on the causes of MAEs; 16 items on why MAEs are not reported; and 20 items on the reported non-intravenous (Brabcová et al.) and IV-related MAEs (9 and 11 items, respectively). Each question in the first two parts was scored on a 6-point Likert scale (1 = strongly disagree and 6 = strongly agree). The result was presented as mean and standard deviation for each item. The third domain was presented as frequency and percentage of type of MAEs, which include non-intravenous and intravenous-related MAEs. They used a 10-point Likert scale. The participants required 10 to 20 minutes to complete the survey.

2.3. Data Collection. The permission to conduct the study was granted by the State Health Director and the director of each of the hospitals. The data collecting method was facilitated by the nursing units. The survey was in English format, but the participants were able to comprehend and respond appropriately. We made sure to get the informed consent of those who were chosen and willing to participate. The questionnaires were collected as soon as the participants completed the survey. Their decisions were not affected by the superior since the procedure occurred in an isolated hall for each hospital involved.

2.4. Data Analysis. The data were entered and analyzed using SPSS ver. 26. Descriptive statistics were used to summarize the result. The mean and standard deviation were used to portray numerical data, considering their normal distribution. Categorical data were reported as frequency and percentage. Multiple logistic regression was used to analyze the variables of age, gender, education level, and job duration, as detailed in the following.

2.5. Ethical Consideration. Ethical approval was obtained from the relevant committees, including Jawatankuasa Etika Penyelidikan Manusia Universiti Sains Malaysia (JEPeM-USM) dated 28th December 2022, bearing the JEPeM Code: USM/JEPeM/22110733, and the National Medical Research Register (NMRR) dated 13th January 2023, with the reference number NMRR ID-22-02882-R29. Strict confidentiality measures were adhered to, and the data analysis and reporting were conducted without revealing participants' identities.

3. Results

3.1. Sociodemographic Characteristics and Job Experience of the Participants. The study involved 424 critical care nurses. Table 1 summarizes the sociodemographic characteristics and job characteristics of the participants in a comparable study by You et al. [23] and Biftu et al. [25]. The mean age was 40.90 ± 6.13 years. Most of the participants are married. The mean work time was 16.83 ± 5.90 years. Most of them worked at Intensive Care Unit (ICU; 39.2%), followed by Neonatal Intensive Care Unit (NICU; 16.3%), Operation Theatre (OT; 15.3%), Emergency Department (ED; 8.3%), Cardiac Care Unit (CCU; 8.0%), High Dependency Ward (HDW; 7.3%), and Paediatric Intensive Care Unit (PICU; 5.7%). Majority of them (79.5%) worked at least 50 hours per week. In their clinical context, 84.9% of the participants reported a nurse-patient ratio of 1:1 to 1:6. Patient safety training was attended by 61.3% of participants. 86.8% of participants were instructed how to administer medications. In contrast, 84.7% and 65.6% of people, respectively, had no prior experience with MAEs, either directly or via observation. The outcome under consideration is critical care nurses' readiness to report MAEs to authorities. Most nurses (60.1%) did not believe errors should be revealed.

3.2. Critical Care Nurses' Perception regarding the Causes of MAEs. Table 2 shows the perception of MAE causes by the critical care nurses. According to the finding, illegible medicine orders from physicians scored the highest items (4.39 ± 1.35) followed by look-alike drugs (4.38 ± 1.47), and package similarity (4.31 ± 1.46) was the third most recognized cause of MAEs. The least cause of MAEs was pharmacists being unavailable for over 24 hours, with a mean value of (1.94 ± 1.20). The remaining items' score ranged from 2.29 to 4.27.

TABLE 1: Sociodemographic characteristics of the participants ($n = 424$).

Variables	<i>n</i> (%)	Mean \pm SD
Age (years)		40.90 \pm 6.13
<i>Sex</i>		
Female	414 (97.6)	
Male	10 (2.4)	
<i>Marital status</i>		
Single	10 (2.4)	
Married	387 (91.3)	
Divorced	27 (6.4)	
<i>Level of education</i>		
Diploma	403 (95.0)	
BSc	21 (5.0)	
<i>Place of working</i>		
HRPZII	276 (65.1)	
HSIP	121 (28.5)	
HTM	27 (6.4)	
Working duration (year)		16.83 \pm 5.90
<i>Working at the current unit</i>		
ICU	166 (39.2)	
NICU	69 (16.3)	
PICU	24 (5.7)	
CCU	34 (8.0)	
HDW	31 (7.3)	
OT	65 (15.3)	
ED	35 (8.3)	
<i>Average weekly work hours</i>		
<50	337 (79.5)	
\geq 50	87 (20.5)	
<i>Nurse-patient ratio current unit</i>		
1:1-6	360 (84.9)	
1:7-10	55 (13.0)	
1:>10	9 (2.1)	
<i>Do you attend any patient safety courses</i>		
Yes	260 (61.3)	
No	164 (38.7)	
<i>Have you attended any courses on medication administration guidelines</i>		
Yes	368 (86.8)	
No	56 (13.2)	
<i>Have you experienced any MAEs</i>		
Yes	65 (15.3)	
No	359 (84.7)	
<i>Have you watched any MAEs by others</i>		
Yes	146 (34.4)	
No	278 (65.6)	
<i>In your perception, when you experience or watch any MAEs, would you report the incident to the authority</i>		
Yes	169 (39.9)	
No	255 (60.1)	

3.3. Critical Care Nurses' Perception of Reasons for Not Reporting MAEs. Table 3 indicates critical care nurses' perceptions of reasons for not reporting MAEs. The highest mean score for a reason not to report MAEs was when MAEs occur, nursing administration focuses on the individual

TABLE 2: The perception of the causes of MAEs among critical care nurses in tertiary hospitals, Kelantan ($n = 424$).

Items	Strongly disagree, n (%)	Moderately disagree, n (%)	Slightly disagree, n (%)	Slightly agree, n (%)	Moderately agree, n (%)	Strongly agree, n (%)	Mean \pm SD*
(1) The names of many medications are similar	43 (10.1)	38 (9.0)	37 (8.7)	124 (29.2)	102 (24.1)	80 (18.9)	4.05 \pm 1.54
(2) Different medications look alike	29 (6.8)	27 (6.4)	44 (10.4)	90 (21.2)	123 (29.0)	111 (26.2)	4.38 \pm 1.47
(3) The packaging of many medications is similar	30 (7.1)	26 (6.1)	46 (10.8)	103 (24.3)	117 (27.6)	102 (24.1)	4.31 \pm 1.46
(4) Physicians' medication orders are not legible	16 (3.8)	29 (6.8)	47 (11.1)	117 (27.6)	110 (25.9)	105 (24.8)	4.39 \pm 1.35
(5) Physicians' medication orders are not clear	14 (3.3)	38 (9.0)	58 (13.7)	112 (26.4)	113 (26.7)	89 (21.0)	4.27 \pm 1.35
(6) Physicians change orders frequently	31 (7.3)	39 (9.2)	60 (14.2)	123 (29.0)	110 (25.9)	61 (14.4)	4.00 \pm 1.42
(7) Abbreviations are used instead of writing the orders out completely	44 (10.4)	54 (12.7)	69 (16.3)	113 (26.7)	82 (19.3)	62 (14.6)	3.76 \pm 1.53
(8) Verbal orders are used instead of written orders	46 (10.8)	57 (13.4)	60 (14.2)	90 (21.2)	90 (21.2)	81 (19.1)	3.86 \pm 1.62
(9) The pharmacy delivers incorrect doses to this unit	100 (23.6)	110 (25.9)	88 (20.8)	76 (17.9)	41 (9.9)	8 (1.9)	2.70 \pm 1.37
(10) The pharmacy does not prepare the medication correctly	117 (27.6)	114 (26.9)	85 (20.0)	72 (17.0)	30 (7.1)	6 (1.4)	2.53 \pm 1.32
(11) The pharmacy does not label the medication correctly	141 (33.3)	108 (25.5)	85 (20.0)	63 (14.9)	21 (5.0)	6 (1.4)	2.37 \pm 1.29
(12) Pharmacists are not available 24 hours a day	211 (49.8)	105 (24.8)	59 (13.9)	27 (6.4)	17 (4.0)	5 (1.2)	1.94 \pm 1.20
(13) Frequent substitution of drugs (i.e., cheaper generic for brand names)	59 (13.9)	76 (17.9)	91 (21.5)	101 (23.8)	68 (16.0)	29 (6.8)	3.31 \pm 1.46
(14) Poor communication between nurses and physicians	64 (15.5)	67 (15.8)	86 (20.3)	109 (25.7)	59 (13.9)	39 (9.2)	3.35 \pm 1.51
(15) Many patients are on the same or similar medications	56 (13.3)	54 (12.7)	60 (14.2)	130 (30.7)	82 (19.6)	41 (9.7)	3.60 \pm 1.51
(16) Unit staff do not receive enough services on new medications	66 (15.6)	65 (15.3)	80 (18.9)	81 (19.1)	79 (18.6)	53 (12.5)	3.47 \pm 1.62
(17) In this unit, there is no easy way to look up information on medications	110 (25.9)	101 (23.8)	88 (20.8)	72 (17.0)	37 (8.7)	16 (3.8)	2.70 \pm 1.43
(18) Nurses in this unit have limited knowledge about medications	93 (21.9)	108 (25.5)	86 (20.3)	68 (16.0)	49 (11.6)	20 (4.7)	2.84 \pm 1.47
(19) Nurses get pulled between teams and from other units	102 (24.1)	78 (18.4)	80 (18.9)	75 (17.7)	66 (15.6)	23 (5.4)	2.99 \pm 1.56
(20) When scheduled medications are delayed, nurses do not communicate the time when the next dose is due	119 (28.1)	91 (21.5)	81 (19.1)	71 (16.7)	36 (8.5)	26 (6.1)	2.75 \pm 1.53
(21) Nurses on this unit do not adhere to the approved medication administration procedure	167 (39.4)	100 (23.6)	68 (16.0)	56 (13.2)	20 (4.7)	13 (3.1)	2.29 \pm 1.38
(22) Nurses are interrupted while administering medications to perform other duties	57 (13.4)	58 (13.7)	49 (11.6)	95 (22.4)	90 (21.2)	75 (17.7)	3.77 \pm 1.66
(23) Unit staffing levels are inadequate	40 (9.4)	59 (13.9)	45 (10.6)	68 (16.0)	84 (19.8)	128 (30.2)	4.13 \pm 1.71
(24) Medication orders are not transcribed to the Kardex correctly	53 (12.5)	68 (16.0)	90 (21.2)	121 (28.5)	62 (14.6)	30 (7.1)	3.38 \pm 1.42
(25) Errors are made in the medication Kardex	78 (18.4)	78 (18.4)	109 (25.7)	102 (24.1)	43 (10.1)	14 (3.3)	2.99 \pm 1.37
(26) Equipment malfunctions or is not set correctly (e.g. IV pump)	100 (23.6)	86 (20.3)	77 (18.2)	68 (16.0)	63 (14.9)	30 (7.1)	3.00 \pm 1.60
(27) The nurse is unaware of a known allergy	107 (25.2)	100 (23.6)	86 (20.3)	92 (21.7)	28 (6.6)	11 (2.6)	2.69 \pm 1.37
(28) Patients are off the ward for other care	152 (35.8)	95 (22.4)	63 (14.9)	65 (15.3)	29 (6.8)	20 (4.7)	2.49 \pm 1.50

*Min (1); max (6).

TABLE 3: The perception of the reasons for not reporting MAEs among critical care nurses in tertiary hospitals, Kelantan (n = 424).

Items	Strongly disagree, n (%)	Moderately disagree, n (%)	Slightly disagree, n (%)	Slightly agree, n (%)	Moderately agree, n (%)	Strongly agree, n (%)	Mean ± SD*
(1) Nurses do not agree with the hospital's definition of a medication error	109 (25.7)	88 (20.8)	106 (25.0)	80 (18.9)	27 (6.4)	14 (3.3)	2.69 ± 1.37
(2) Nurses do not recognize an error occurred	134 (31.6)	87 (20.5)	80 (18.9)	77 (18.2)	33 (7.8)	13 (3.1)	2.59 ± 1.44
(3) Filling out an incident report for a medication error takes too much time	126 (29.7)	90 (21.2)	87 (20.5)	72 (17.0)	35 (8.3)	14 (3.3)	2.63 ± 1.44
(4) Contacting the physician about a medication error takes too much time	154 (36.3)	104 (24.5)	80 (18.9)	55 (13.0)	20 (4.7)	11 (2.6)	2.33 ± 1.34
(5) Medication error is not clearly defined	111 (26.2)	86 (20.3)	97 (22.9)	83 (19.6)	34 (8.0)	13 (3.1)	2.72 ± 1.40
(6) Nurses may not think the error is important enough to be reported	256 (60.4)	72 (17.0)	54 (12.7)	26 (6.1)	10 (2.4)	6 (1.4)	1.77 ± 1.17
(7) Nurses believe that other nurses will think they are incompetent if they make medication errors	161 (38.0)	100 (23.6)	64 (13.4)	57 (13.4)	29 (6.8)	13 (3.1)	2.37 ± 1.43
(8) The patient or family might develop a negative attitude toward the nurse or may sue the nurse if a medication error is reported	97 (22.9)	76 (17.9)	81 (19.1)	82 (19.3)	51 (12.0)	37 (8.7)	3.06 ± 1.60
(9) The expectation that medications be given exactly as ordered is unrealistic	208 (49.1)	87 (20.5)	69 (16.3)	38 (9.0)	18 (4.2)	4 (0.9)	2.02 ± 1.24
(10) Nurses are afraid the physician will reprimand them for the medication error	165 (38.9)	97 (22.9)	77 (18.2)	44 (10.4)	24 (5.7)	17 (4.0)	2.33 ± 1.43
(11) Nurses fear adverse consequences from reporting medication errors	144 (34.0)	79 (18.6)	67 (15.8)	56 (13.2)	51 (12.0)	27 (6.4)	2.70 ± 1.63
(12) The response by the nursing administration does not match the severity of the error	133 (31.4)	75 (17.7)	71 (16.7)	67 (15.8)	52 (12.3)	26 (6.1)	2.78 ± 1.61
(13) Nurses could be blamed if something happens to the patient as a result of the medication error	70 (16.5)	47 (11.1)	62 (14.6)	83 (19.6)	88 (20.8)	74 (17.5)	3.69 ± 1.70
(14) No positive feedback is given for passing medications correctly	103 (24.3)	71 (16.7)	103 (24.3)	75 (17.7)	47 (11.1)	25 (5.9)	2.92 ± 1.51
(15) Too much emphasis is placed on med errors as a measure of the quality of nursing care provided	97 (22.9)	76 (17.9)	90 (21.2)	85 (20.0)	49 (11.6)	27 (6.4)	2.99 ± 1.53
(16) When med errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of the error	54 (12.7)	50 (11.8)	65 (15.3)	91 (21.5)	86 (20.3)	78 (18.4)	3.80 ± 1.64

* Min (1), max (6).

rather than looking at the systems as a potential cause of the error (3.80 ± 1.64). The second higher mean score was when nurses could be blamed if something happens to the patient as a result of the medication error (3.69 ± 1.70), and the third reason was when the patient or family might develop a negative attitude toward the nurse or may sue the nurse if a medication error is reported (3.06 ± 1.60).

3.4. Perceived Reported Medication Administration Errors (MAEs) by Intravenous and Non-Intravenous (Non-IV) Routes among Critical Care Nurses. Table 4 shows the percentage of perceived MAEs for each item in Kelantan government hospitals with specialists. The data show that the MAEs with the greatest perceived intravenous drug error rates were incorrect timing (16.5%), wrong dosage (16.3%), and wrong route (16.1%). The least perceived medication error was IV fluid mismatch (14.9%). The highest percentages for non-intravenous MAEs were 18.9% for medication given at the inappropriate time, 18.6% for method, and 18.2% for dosage.

4. Discussion

MAE prevention is a main focus of hospital quality improvement and risk management initiatives. Medication administration is generally entrusted to nurses and is an important component of nursing practice, having a substantial impact on patient safety and the provision of high-quality healthcare services. Nurses receive medication administration training in order to reduce drug-related incidents in hospital settings, as they play a critical role in preventing such errors prior to medication administration to patients.

According to the findings of the current study, 61.3% of participants had attended patient safety courses, showing that they had received enough training on safe and effective patient care. In comparison to a survey conducted in Seoul, just 47.8% of participants had received patient safety education [26]. However, in an Ethiopian study, 84.5% of participants did not get patient safety training [27]. This is concerning because healthcare providers require adequate patient safety training to avoid making errors that endanger patients. It emphasizes the need of healthcare organizations stressing patient safety education and training for their employees [28]. Medication administration instructions were given to more than 80% of study participants. This demonstrates the importance of critical care hospitals prioritizing employee training on medication administration practices. But, only 55.7% of Ethiopian study participants obtained medical administration instruction [6].

The present study's results indicated that 84.7% of critical care nurses had no MAE experience, compared to a previous study in Turkey, where 73.9% of nurses had no MAE experience, showing that the current study had improved better in terms of practicing patient safety culture [29, 30]. However, prior MAE experience was reported by 69.6% of nurses in South Korea, demonstrating that MAE prevalence differs among healthcare systems and settings

[31]. These disparities in prevalence could be attributed by differences in reporting standards or medication administration practices [32]. These findings emphasize the significance of continuing education for healthcare personnel especially critical care nurses in ensuring patient safety. According to the results of this survey, 65.6% of respondents have seen MAEs performed by others. This shows that MAEs are common in clinical settings and can risk patient safety. According to a recent Turkish study, 55.8% of respondents reported witnessing MAEs [29]. It emphasizes the significance of encouraging nurses to report and treat MAEs to improve patient safety. Having healthcare personnel report MAEs helps organizations discover areas for improvement and take preventive measures.

MAEs are causing worry in healthcare settings since they may endanger patients. MAEs can arise as a result of problems with drug ordering, dispensing, administration, and monitoring. According to critical care nurses, unclear physician prescription instructions induced MAEs. A similar finding was found in a South Korean study [31], where nurses assessed the unreadable physician's medication order as extremely crucial in contributing to MAEs. Both studies emphasize the need of legible medication instructions in avoiding MAEs. Clear and easy-to-read prescription instructions are important to avoid medication errors, and this can be achieved through standardized templates, electronic prescribing, or better physician training [33]. According to a South African study, MAEs may be caused by illegible handwriting. Prescription interpretation was performed by pharmacists 75% of the time and nurses 81.8% of the time [34]. This study highlights the significance of healthcare providers giving legible and explicit prescription instructions during medication administration [12]. The introduction of comparable drugs was the second most common cause of MAEs. It is worth noting that nurses in the United States reported this difficulty more frequently, implying that it is a more general issue [35]. When many prescriptions have identical colors or formats, it can be confusing. Critical care nurses identified this issue as the second most common cause of MAEs in this study, emphasizing its importance in medication use. Drug packaging, labelling requirements, and cultural variances may all contribute to this impression mismatch [3, 36, 37].

Nursing administration attributes prescription errors to individual acts or oversights rather than systemic issues. According to the majority of critical care nurses, nursing administration prioritized the individual over the system, which is consistent with previous study and conclusions [3, 31, 35]. Nursing administration, according to these studies, blames nurses for prescription errors rather than addressing systemic issues. This limited view of human responsibility may make it more difficult to explain drug mishaps. As a result, addressing the contextual factors driving medication errors requires a thorough strategy. Healthcare medicine administration must change for the sake of safety and efficiency [38, 39]. Another MAE myth that critical care nurses in this study perceived was that nurses may be held accountable for patient damage caused by prescription errors. According to a Saudi Arabian study,

TABLE 4: The percentage of perceived medication administration errors reported for each type by the critical care nurses in tertiary hospitals, Kelantan ($n = 424$).

Type of medication errors	Percentage of each type of medication error reported (%) [*]	
	IV-related MAEs	Non-IV-related MAEs
(1) Wrong route of administration	16.1	18.6
(2) Wrong time of administration	16.5	18.9
(3) Wrong patient	15.4	16.5
(4) Wrong dose	16.3	18.2
(5) Wrong drug	15.6	16.7
(6) Medication is omitted	24.2	26.5
(7) Medication is given but has not been ordered by the physician	15.0	14.7
(8) Medication is administered after the order to discontinue has been written	15.6	15.2
(9) Given to patients with a known allergy	15.3	15.1
(10) Wrong fluid	14.9	
(11) Wrong rate of administration	15.5	

*Min (0); max (100).

nurses were unwilling to report medication mistakes for fear of being implicated [40]. According to this study, nurses may be hesitant to disclose prescription errors for fear of disciplinary or legal penalties. This emphasizes the need of building a safety culture in healthcare companies that encourages reporting and learning from errors rather than condemning nurses [41]. Such an approach may improve patient safety and service quality by encouraging openness and responsibility [41, 42].

In this study, non-intravenous and intravenous MAEs included medication administration at the inappropriate time, route, and dose. In non-IV and IV-related MAEs, medication was rarely given without a doctor's order. Medication distribution at an inconvenient time was the most common IV-related MAE in Saudi Arabia [40]. South Korean studies produced a range of results. Giving medicine to the wrong patient was the most common non-intravenous MAE, while improper drug infusion rate was the most common IV-related MAE [31]. Effective communication among the healthcare team and adherence to medication order protocols may help decrease MAEs. Ongoing education, training, and monitoring are essential for ensuring medication safety [6].

This study does have a few limitations. It is based on data that participants reported themselves, which could be influenced by biases. These biases could include misremembering past events, wanting to appear in a positive light, and interpreting questions differently. Most of the people who took part in the study are critical care nurses who are 40 years old. It is possible that the responses are biased because people who have made or seen medication errors might be more willing to admit them. Using questionnaires to collect self-reported data can limit the amount of detailed information about how often medication errors happen or how serious they are.

5. Conclusion

In conclusion, the study looked into the perceptions of critical care nurses on the causes of MAEs in public hospitals with specialists in Kelantan, as well as the reasons for not reporting these MAEs. According to the findings of this study, illegible

medication orders from physicians, drug similarity, and medication package similarity are the top contributors to MAEs in the eyes of nurses. In contrast, the key reasons why MAEs are not reported are that nursing administration focuses on persons rather than systems, nurses may be held accountable, and patients and their families may file legal action against them. The findings highlight the importance of developing comprehensive strategies to address the highlighted reasons, improve communication and training, decrease strain and time pressure, and create a safety culture that fosters error reporting and learning. Further study is required to investigate the efficacy of these approaches in reducing MAEs.

Data Availability

The data are not publicly available due to privacy and confidentiality. However, restrictions apply to the availability of hospital data, which are available from the authors with the organization's permission.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' Contributions

MII conceptualized the study, contributed to literature review, led the project, reviewed the article, and edited the article. MSI performed analysis, wrote the article, and provided references. All authors have read and agreed to the published version of the article.

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Research Article

Cross-Cultural Adaptation and Psychometric Evaluation of the Chinese Version of the Authentic Nurse Leadership Questionnaire

Hanyi Wang ¹, Zequan Wang ², Cancan Chen ³, and Wanhong Wei ¹

¹School of Nursing and Health, Zhengzhou University, Zhengzhou 450001, China

²University of Connecticut School of Nursing, 231 Glenbrook Rd, Unit 4026, Storrs, CT, USA

³Department of Nursing, Henan Provincial Key Medicine Laboratory of Nursing, Henan Provincial People's Hospital; Zhengzhou University People's Hospital, Zhengzhou, Henan 450003, China

Correspondence should be addressed to Wanhong Wei; zdwwh@zzu.edu.cn

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Aims. To adapt the Authentic Nurse Leadership Questionnaire (ANLQ) to the Chinese cultural context and evaluate its psychometric properties. **Background.** Authenticity serves as a pivotal factor in the dynamic interaction between nurse leaders and nurse staff, exerting a profound influence on the growth of nurse individuals, healthcare teams, and organizations. However, there is still a dearth of research instruments to assess nurses' perception of authentic leadership in China. **Methods.** After authorization from the original author and technical support had been secured, a systematic process of initial translation, back translation, expert panel review, and pretesting was employed to ensure cross-cultural adaptation in accordance with established guidelines. A two-stage study design was implemented. In stage 1, 189 nurses were sampled for psychometric validation, during which the internal consistency reliability, split-half reliability, and test-retest reliability were tested and exploratory factor analysis was performed. In stage 2, 255 nurses were sampled for confirmatory factor analysis and assessment of convergent and discriminant validity, to further validate the constructs. **Results.** In stage 1, the validated instrument showed a Cronbach's alpha value of 0.973, a split-half coefficient of 0.888, and a test-retest reliability coefficient of 0.912. The exploratory factor analysis extracted five dimensions that accounted for 82.629% of the overall variance. The findings in stage 2 showed that the observed data were well fitted to the five-factor theoretical model, with acceptable levels of convergent and discriminant validity. **Conclusions.** The Chinese version of the ANLQ demonstrated appropriate psychometric properties, as evidenced by its good reliability and validity. **Implications for Nursing Management.** This study offers nurse administrators and executives a valuable instrument, enabling them to establish leadership evaluation criteria, conduct nurse leader performance appraisals, and assist in selecting new nurse leaders. Ultimately, this contributes to the cultivation and development of exceptional managers capable of providing positive leadership to their followers.

1. Introduction

In the rapidly evolving contemporary healthcare setting, ethical dilemmas are frequently encountered [1]. Given the deep integration of nursing with intricate human relationships, these ethical dilemmas are amplified, resulting in undesirable outcomes such as moral distress, decreased job satisfaction, burnout, intrateam conflicts, and compromised patient care [2–4]. Consequently, there is a growing discourse surrounding the importance of values-based leadership and relational leadership as potential strategies to

address these dynamic changes [5–7]. Authentic leadership (AL), which is a common component of both aforementioned leadership styles [6, 8, 9], fosters a distinctive relationship between the leader and followers that is marked by high levels of trust, transparency, and integrity [10]. In addition, AL reflects the alignment between the core values of the leader and those demonstrated within the values-based leadership framework [8]. Many studies have emphasized the importance of AL as the foundational basis for various forms of positive leadership [11], highlighting its positive impacts on healthcare staff [6, 12]. These impacts

include improving job satisfaction [10], fostering optimism and trust, promoting engagement, and cultivating a supportive work environment [7, 13], ultimately leading to better patient care quality [14]. Furthermore, research has underscored the crucial role of AL in mitigating the emotional exhaustion of followers, reducing workplace stress, alleviating cynicism, preventing burnout, and reducing turnover intention [10, 15–17]. Thus, authenticity, recognized as the paramount aspect of human interaction, is of immense value in healthcare settings that prioritize interpersonal relationships [16] and communication that focuses on the needs and effectiveness of others. Authentic leaders, by exemplifying AL behaviour, not only inspire and motivate their followers while improving their work efficacy [17] but also provide a favourable pathway for their own personal growth and advancement [12].

The majority of existing instruments used to measure AL were developed based on earlier AL theories [11, 18] and showed similarities in terms of their structure, content, and measurement indices. One notable example is the Authentic Leadership Questionnaire (ALQ) developed by Walumbwa et al. [19] in 2008. Notwithstanding the widespread use of the ALQ in healthcare and its adoption in the Chinese nursing domain, it is essential to recognize that the instrument was originally tailored for the for-profit corporate setting. Consequently, the questionnaire may lack fundamental nursing concepts and exhibit limited relevance when applied in the context of nursing practice. In 2011, a group of researchers addressed criticisms of the ALQ and made modifications, resulting in the development of an instrument with four subscales, the 14-item Authentic Leadership Inventory (ALI) [20]. However, the validation process conducted by Davidson et al. [21] for the ALI specifically in the U.S. acute care setting confirmed only a single-factor structure, highlighting the need for further validation of the four-factor structure in the nursing context. Another instrument, the 13-item Authentic Leadership Self-Assessment Questionnaire (ALSAQ, Polish version) [22], demonstrated a favourable Cronbach's alpha of 0.84. However, two out of the three subscales did not meet the criterion of 0.7 for Cronbach's alpha and lacked convergent and discriminant validity [23]. Although the ALSAQ is intended for professional nurses, it assesses registered nurses' perceptions of their own AL, not the AL exhibited by nurse leaders. Moreover, the recruitment of nurses mainly from postgraduate education centres raises doubts about its applicability to clinical settings.

Giordano-Mulligan [24] developed the 29-item Authentic Nurse Leadership Questionnaire (ANLQ) to measure nurses' perception of the AL by nurse leaders, with a specific focus on the core attribute of caring in nursing. By integrating Jean Watson's theory of caring [25] with AL theory, the questionnaire addressed the limitations of existing measures in capturing essential nursing characteristics. The ANLQ has exhibited acceptable psychometric properties with a Cronbach's alpha value of 0.99 and 5 subscales ranging from 0.89 to 0.97. However, its applicability to Chinese nurses from socially and ethnically diverse backgrounds needs to be tested. Therefore, the objective of

this study was to report on the cross-cultural adaptation processes and psychometric properties of the ANLQ to prompt a better understanding of its psychological structure in the Chinese cultural context.

2. Methods

2.1. Translation and Cross-Cultural Adaptation. The ANLQ was translated with the consent and permission of Dr. Giordano-Mulligan. In accordance with Beaton's cross-cultural adaptation guidelines [26] and Brislin's back-translation model [27], several adaptation steps were followed.

2.1.1. Initial Translation with Synthesis. The translation was independently completed by two native Chinese translators, one of whom was a lecturer who had lived in the United States for six years and obtained her doctoral degree in nursing there and the other of whom had graduated with a master's degree and worked as a professional English translator for 14 years. Another professor, a Ph.D. in nursing management, compared the two independent translations word for word and synthesized them into one version.

2.1.2. Back Translation with Reconciliation. The translated version was back-translated to English by two other translators with bilingual backgrounds and no exposure to the original questionnaire, one of whom was a medical doctor who had studied and lived in the United States for 12 years and the other of whom was an American lecturer with no medical background who had worked as a teacher in China for 10 years. Subsequently, another medical doctor who was a visiting scholar at Duke University was invited to compare the two translations and then provided feedback to the original author for verification. Finally, the synthesized Chinese version was modified accordingly to ensure that the expressions retained their original connotation.

2.1.3. Expert Panel Review. Seven experts with master's degrees or above were invited to participate in an expert panel for the study. The panel consisted of a professor with experience in psychological nursing, a methodologist, a linguistics expert, two professors of nursing management, and two nursing administrators with 13 and 34 years of clinical experience. One of the experts, Dr. Sun, was a Chinese American invited by Dr. Giordano-Mulligan to review the translations of the various versions and provide technical support. The cross-cultural adaptation process involved using e-mail, face-to-face interactions, and Zoom videoconferencing, to engage experts in reviewing materials during both initial translation and back translation. The researcher synthesized expert opinions, and in cases of disagreement, the final decision was determined through a written ballot. Subsequently, six experts were invited to assess content validity, scoring each item on a scale from 1 (not relevant) to 4 (highly relevant). A validity threshold was set at an item-level content validity index (I-CVI) of 0.78 or higher and a scale-level average CVI (S-CVI/Ave) of 0.9 or above.

2.1.4. Pilot Testing and Reporting. To ensure that the language used in the questionnaire was both understandable and acceptable, a preliminary investigation was conducted by convenience sampling 30 nurses from various age groups, educational levels, and professional titles. Afterwards, each respondent participated in a 15–20-minute interview to discuss whether they understood each item correctly and if they had any incomprehensible details.

2.2. Study Design and Participants. A two-stage cross-sectional survey design employing convenience sampling was implemented in this study. In stage 1, participants were recruited from two tertiary comprehensive hospitals in Henan Province, China. Within each hospital, sample selection was based on the proportion of nurses in different departments to ensure sample diversity. The sample size for the exploratory factor analysis (EFA) adhered to the recommended item response ratio of 1:5 to 1:10 [28]. To accommodate a potential 20% questionnaire invalidity rate, a minimum sample size of 182 participants was determined. The inclusion criteria were registered nurses who (1) were employed and age 18 years or older, (2) had worked with their current nurse leader for ≥ 1 year, and (3) were under the direct leadership of the nurse leader. The exclusion criteria were nurses who were not at work (e.g., on further training, missions, or leave of absence) and those rotating within the department during the study period. For the test-retest reliability assessment, thirty respondents were selected and returned to complete the C-ANLQ after a two-week interval.

Moving to stage 2, participants were drawn from the other two tertiary comprehensive hospitals ensuring a distinct selection from those involved in stage 1. It is generally accepted that the sample size for confirmatory factor analysis (CFA) should not be less than 200 [29], with an additional 20% accounting for potential invalid responses, thus establishing a minimum sample size of 250 participants. Inclusion criteria mirrored those of stage 1 participants.

2.3. Instruments

2.3.1. General Information Questionnaire. The self-designed demographic questionnaire included 8 questions on the participant's age, gender, marital status, department affiliation, years of experience, years working with the current nurse leader, education, and professional title.

2.3.2. Authentic Nurse Leadership Questionnaire. The ANLQ is a 29-item instrument developed by Giordano-Mulligan [24] with five subscales: self-awareness, moral ethical courage, relational integrality, shared decision making, and caring. The instrument uses a 5-point Likert scale ranging from 0 (never) to 4 (all time), with an overall score ranging from 0 to 116. A higher score indicates a higher level of perceived authentic leadership by nurses. The instrument was validated by Hwang et al. in a group of Korean nurses [15], with a total Cronbach's alpha coefficient of 0.97, which indicated good psychometric properties.

2.3.3. Authentic Leadership Questionnaire. The 16-item ALQ was developed by Walumbwa et al. [19] and consists of four subscales: self-awareness, relational transparency, internalized moral perspective, and balanced processing. The items are measured on a 5-point Likert scale from 0 (highly disagree) to 4 (fully agree), with a total score ranging from 0 to 64. The Cronbach's alpha coefficient for the Chinese version [30] of ALQ was 0.95, and the one in this study was also 0.95.

2.4. Data Collection. Initial support was secured from the participating hospitals and nursing supervisors before commencing the field survey. The data for stage 1 were gathered between January and February 2023. Participants received printed questionnaires in sealed envelopes from the investigator and submitted them on the spot. To minimize bias, they completed the questionnaire in the absence of the nurse leader. Additionally, for those willing to participate in the follow-up survey, we recorded their contact details and assigned numbers for the assessment of test-retest reliability two weeks after the initial survey. Stage 2 data collection occurred between March and April 2023, following the same protocol as stage 1.

2.5. Data Analysis. The data analysis was conducted using IBM SPSS software (version 26.0) and AMOS software (version 24.0) for Windows. Descriptive statistics were used to analyse participant characteristics as necessary. In stage 1, the internal reliability of the scale was assessed using both Cronbach's alpha coefficient and the split-half reliability coefficient. A Cronbach's alpha coefficient of ≥ 0.9 was considered excellent, ≥ 0.8 indicated high reliability, and ≥ 0.7 was considered acceptable. The Spearman–Brown coefficient was used to correct the number of items in which the two subscales were not equal [28]. Test-retest reliability was used to capture external reliability, and a value greater than 0.7 indicated a high degree of stability of the scale. Item analysis was conducted with the critical ratio (CR) method (a sample *t*-test to compare the differences between the upper 27% and lower 27% of the subgroups), and homogeneity tests were used as screening indicators for each of the individual items. Items with a CR value < 3.0 , item-total correlation coefficient < 0.4 , or an increase of 0.5 or more in Cronbach's alpha after the deletion of the item were removed.

Construct validity was verified by a joint evaluation of EFA and CFA. The Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity were initially performed to determine the sample fit to confirm that EFA was appropriate. Factors were extracted based on an eigenvalue > 1.0 , scree plot, and factor loading ≥ 0.5 . In stage 2, the CFA further validated the default model from stage 1, in which the parameters were estimated using the maximum likelihood method. Convergent validity was considered appropriate with an average variance extracted (AVE) > 0.5 , standardized factor loading > 0.5 , and composite reliability > 0.7 [31]. Determining discriminant validity, we ensured that the square root of the AVE was greater than the correlation coefficient between each factor and the other factors.

Pearson correlation analysis was used to determine the association between the C-ANLQ and the ALQ to evaluate criterion validity.

3. Results

3.1. Translation and Cross-Cultural Adaptation. In the cross-cultural adaptation phase, considering the potential difficulty of Chinese nurses comprehending the term “visible” in item 4, the word was replaced to convey a meaning understandable in the Chinese healthcare context. Following two rounds of expert discussions, “visible” was translated as “appearing frequently in front of nurses and actively interacting with them.” Additionally, after consulting with the original author and expert panel, item 22 was modified to read “My nurse leader participates in organizations or activities associated with the nursing profession,” providing a more detailed explanation for nurses. This phase involved revising a total of 12 items and adjusting the labels for both dimensions and the questionnaire title.

During the pilot testing phase, nurses took approximately 3–5 minutes to complete the questionnaire. In response to nurses’ misunderstandings of “group pressure,” the wording was amended, and supplementary instructions were included based on integrated group feedback. Consequently, item 9, “My nurse leader would not be influenced by negative group pressure,” was revised to “My nurse leader would not be influenced by negative group pressure (e.g., the influence of doctors, nurses, supervisors, medical techniques and colleagues in clinical support departments).” Item 28, “My nurse leader pampers the personal growth of followers,” was adjusted to “My nurse leader fosters followers and promotes their personal growth.” This change was made because several nurses noted that “pampering followers” behaviour was slightly exaggerated and that it was more appropriate to use the language of fostering between leaders and followers. Additionally, four redundant statements were streamlined during the pretest. Throughout the research process leading to this stage, the Chinese version of the ANLQ was formed, proving relevant to clinical nursing work and easily comprehensible.

3.2. Participant Characteristics. In stage 1, all 200 participants who met the criteria responded and returned the questionnaires. However, 11 questionnaires were found to be spurious, as all the items were filled in with the same answer. Consequently, 189 questionnaires (94.50%, 189/200) were deemed valid. Moving to stage 2, the survey involved 280 registered nurses, 278 of whom returned the questionnaires, yielding a response rate of 99.29%. After excluding incomplete questionnaires and spurious responses, a total of 255 questionnaires (91.07%, 255/280) were considered valid. The characteristics and demographics of the participants in the two stages are shown in Table 1.

3.3. Reliability and Item Analysis. The item-total correlations for the 29-item C-ANLQ ranged from 0.600 to 0.875, indicating that item-total correlations not only achieved

significance ($p < 0.001$) but also showed a mid-high correlation ($r > 0.40$). The independent t -test showed that the CR value for each item significantly differed ($p < 0.001$) in the high subgroup (>73%, score = 92) and the low subgroup (<27%, score = 68). Consequently, there was no need to delete any items, since they were sufficiently distinct from one another, and there was a good homogeneity from the items to the total scale.

Cronbach’s alpha coefficient and the split-half reliability were used to validate the internal consistency of the C-ANLQ. The Cronbach’s alpha value was 0.973 for the total scale and ranged from 0.921 to 0.972 for the subscales, with a split-half reliability of 0.888. The alpha coefficients ranged from 0.971 to 0.973 if an item was deleted, indicating that no item needed to be considered for deletion. Moreover, there was a statistically significant correlation between the test and retest for “self-awareness” ($r = 0.769$, $p < 0.001$), “moral ethical courage” ($r = 0.818$, $p < 0.001$), “relational integrity” ($r = 0.850$, $p < 0.001$), “shared decision making” ($r = 0.814$, $p < 0.001$), “caring” ($r = 0.878$, $p < 0.001$), and the C-ANLQ total score ($r = 0.912$, $p < 0.001$).

3.4. Content Validity and Criterion Validity. Six experts were invited to rate the content validity two weeks after the expert panel review. The results showed that the I-CVI ranged from 0.83 to 1.00 (greater than 0.78), and the S-CVI/Ave was 0.97 (greater than 0.9), indicating good content validity. The Pearson’s correlation results (see Table 2) showed positive correlations of the C-ANLQ (and subscales) with both the C-ALQ (and subscales), from 0.586 to 0.783, and all correlations were significant ($p < 0.001$).

3.5. Construct Validity. The KMO coefficient was 0.954, and Bartlett’s test was significant (chi-square = 6450.072, $p < 0.001$), which supported the feasibility of EFA (with a sample of 189 nurses, stage 1). Five factors were extracted (see Figure 1) by using principal component analysis (PCA) with varimax rotation; these factors explained 82.629% of the total variance. Table 3 details the results of descriptive statistical analysis and EFA for the C-ANLQ. The factor loadings on each item exceeded the acceptable level in the range of 0.697 to 0.863, and no cross-loading was observed, with the communality of each item over 0.4; thus, all items were retained.

The five-factor structure was then validated using CFA on a sample of 255 nurses in stage 2. The initial model fit indices showed an inadequate model fit, which was corrected by adding four residual paths based on the principle of maximizing the modification index [32], which ultimately improved the model fit and formed the CFA-modified model (see Figure 2). The initial and modified model fit indices are shown in Table 4.

3.6. Convergent and Discriminant Validity. The standardized factor loadings of all items in the C-ANLQ were statistically significant ($p < 0.001$) and higher than 0.5, ranging from 0.637 to 0.891. In addition, the AVE estimates ranged from

TABLE 1: Social and demographic information of the participants (stage 1, $n = 189$; stage 2, $n = 255$).

Descriptive characteristics	Stage 1		Stage 2	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Gender				
Male	18	9.5	17	6.7
Female	171	90.5	238	93.3
Age, years ($M \pm SD$)	32.40	6.415	31.47	6.526
Education				
High school	4	2.1	5	2.0
Junior college	39	20.6	40	15.7
Undergraduate	145	76.7	201	78.8
Postgraduate or above	1	0.5	9	3.5
Marital status				
Unmarried	45	23.8	93	36.5
Married	141	74.6	159	62.4
Divorced or widowed	3	1.6	3	1.2
Department affiliation				
Internal medicine	49	25.9	84	32.9
Surgery	22	11.6	59	23.1
Emergency department	16	8.5	29	11.4
Intensive care unit	36	19.0	24	9.4
Obstetrics and gynaecology	12	6.3	22	8.6
Paediatrics	16	8.5	23	9.0
Operating room	38	20.1	14	5.5
Work experience, years ($M \pm SD$)	9.96	7.457	9.39	6.515
Work with the current nurse leader, years ($M \pm SD$)	6.51	5.249	5.32	4.407
Professional title				
Primary nurse	39	20.6	43	16.9
Nurse practitioner	66	34.9	109	42.7
Nurse-in-charge	83	43.9	99	38.8
Deputy director nurse	1	0.5	4	1.6

$M \pm SD$: mean \pm standard deviation.

TABLE 2: Pearson's correlations between C-ANLQ and ALQ ($n = 40$).

	ALQ (total)	Self-awareness	Internalized moral perspective	Relational transparency	Balanced processing
C-ANLQ (total)	0.783	0.733	0.740	0.697	0.705
Self-awareness	0.774	0.755	0.727	0.675	0.689
Moral ethical courage	0.690	0.620	0.673	0.650	0.591
Relational integrity	0.778	0.728	0.725	0.735	0.676
Shared decision making	0.740	0.684	0.688	0.633	0.708
Caring	0.696	0.661	0.663	0.586	0.641

All $p < 0.001$.

0.560 to 0.608, all of which were higher than 0.5, while the composite reliability estimates ranged from 0.884 to 0.914, with all above 0.7. As shown in Table 5, the square roots of the AVE of all five dimensions were greater than their correlation coefficients, indicating that the dimensions were discriminated.

4. Discussion

An integral part of nursing practice is the nurse leader's ability to build authentic relationships with nurse staff through his or her authentic leadership. This ability generates positive attitudes among nurse staff, which, in turn, improves the quality of care. This study describes the first verified study of the C-ANLQ in China, which was validated

by a two-stage survey. The adapting process of the instrument followed Beaton's cross-cultural adaptation guidelines [26] and Brislin's back-translation model [27]. These guidelines suggest that in cross-cultural research, it is crucial to not only maintain semantic and conceptual equivalence with the original scale but also paraphrase one's own culture-specific experiences or behaviours. This ensures the relevance and applicability of the instrument in the specific cultural context. Moreover, continuous communication with the original author was pivotal to ensure that the instrument was suitable for the Chinese cultural context while preserving the integrity of the original version.

The C-ANLQ demonstrated good psychometric properties in the sample of registered nurses in this study. For item analysis, the item-total correlations were acceptable, as

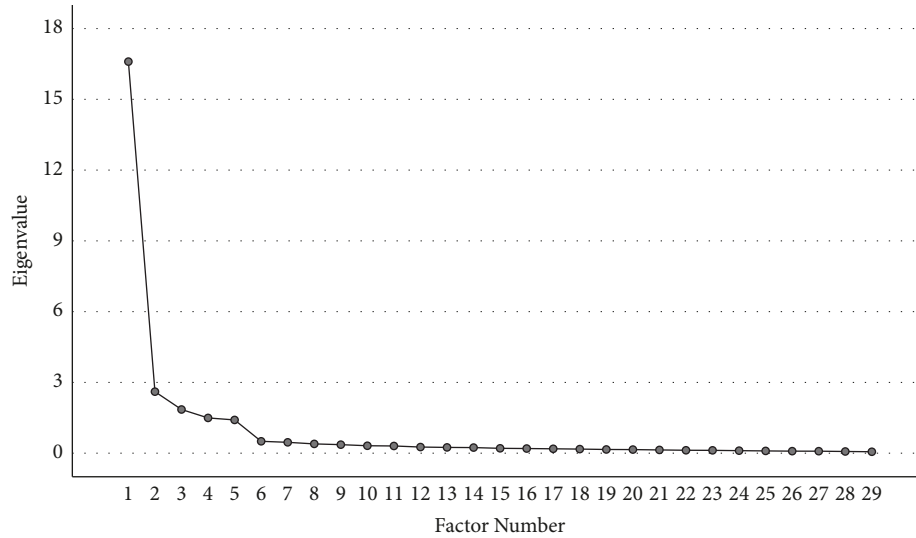


FIGURE 1: Scree plot.

TABLE 3: Results of descriptive statistics and exploratory factor analysis ($n = 189$).

Items	Mean	SD	Factor					C^2
			1	2	3	4	5	
Q1	3.05	0.849	0.215	0.123	0.149	0.756	0.177	0.686
Q2	2.74	0.925	0.224	0.256	0.289	0.740	0.138	0.766
Q3	2.70	0.994	0.215	0.199	0.303	0.734	0.218	0.764
Q4	2.84	0.928	0.211	0.286	0.374	0.697	0.127	0.768
Q5	3.17	0.794	0.204	0.152	0.057	0.730	0.307	0.696
Q6	2.97	0.841	0.128	0.194	0.152	0.781	0.242	0.746
Q7	2.38	0.923	0.261	0.116	0.188	0.306	0.813	0.873
Q8	2.39	1.039	0.262	0.152	0.264	0.259	0.798	0.865
Q9	2.16	1.072	0.184	0.075	0.172	0.193	0.863	0.850
Q10	2.14	1.088	0.185	0.157	0.137	0.241	0.837	0.836
Q11	2.49	1.133	0.758	0.291	0.225	0.234	0.111	0.778
Q12	2.82	0.984	0.722	0.232	0.312	0.289	0.274	0.832
Q13	2.70	1.010	0.755	0.323	0.258	0.211	0.273	0.860
Q14	2.53	1.065	0.752	0.243	0.187	0.169	0.157	0.712
Q15	2.74	0.947	0.799	0.262	0.190	0.165	0.234	0.825
Q16	2.74	0.964	0.820	0.217	0.283	0.157	0.217	0.871
Q17	2.63	1.076	0.709	0.282	0.337	0.301	0.137	0.806
Q18	2.77	1.076	0.337	0.784	0.281	0.209	0.035	0.851
Q19	2.96	0.880	0.253	0.823	0.241	0.247	0.082	0.866
Q20	2.78	1.054	0.285	0.819	0.275	0.198	0.055	0.870
Q21	2.79	0.977	0.268	0.817	0.269	0.166	0.142	0.860
Q22	2.93	0.954	0.237	0.819	0.184	0.204	0.181	0.836
Q23	2.87	0.981	0.213	0.803	0.300	0.184	0.195	0.851
Q24	2.51	1.070	0.276	0.296	0.770	0.261	0.201	0.865
Q25	2.66	1.038	0.293	0.423	0.703	0.295	0.210	0.890
Q26	2.60	1.045	0.247	0.360	0.752	0.234	0.244	0.870
Q27	2.52	1.019	0.277	0.280	0.812	0.245	0.207	0.917
Q28	2.53	0.998	0.335	0.253	0.789	0.215	0.180	0.876
Q29	2.47	1.034	0.331	0.301	0.781	0.213	0.143	0.875
Eigenvalues			16.599	2.608	1.852	1.495	1.409	
Explained variance (%)			57.239	8.992	6.386	5.154	4.859	
Cumulative variance (%)			57.239	66.230	72.616	77.770	82.629	
Cronbach's alpha of each subscale			0.957	0.963	0.972	0.921	0.941	

F1: relational integrity; F2: shared decision making; F3: caring; F4: self-awareness; F5: moral ethical courage; SD: standard deviation; C^2 : communality. The factor loading values with absolute values greater than 0.400 are shown in bold.

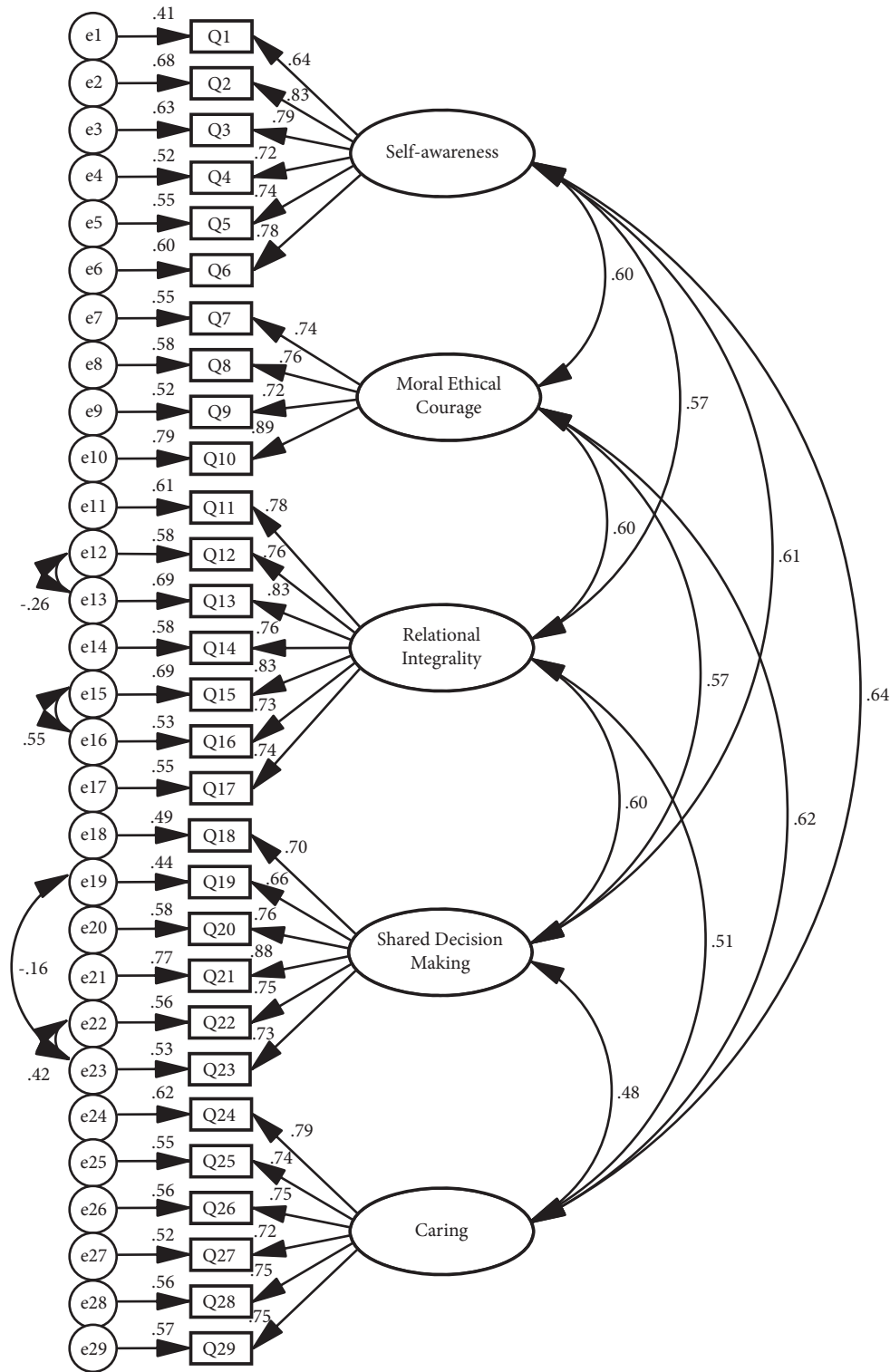


FIGURE 2: Confirmatory factor analysis modified model.

all were over 0.4, indicating that all items in the instrument measured the same constructs. In addition, all 29 items had CR values in excess of 3 and at the 0.05 level of significance, showing that all items were able to discriminate between the levels of variance reflected by different respondents. In the study, Cronbach's α coefficient for the total scale and each

subscale exceeded 0.9, representing a favourable level of internal consistency reliability, which is compatible with the results of other studies [15, 33]. The Cronbach's α coefficient derived after deleting each item separately never surpassed the overall Cronbach's α coefficient of the questionnaire, indicating that the psychological traits to be measured by

TABLE 4: Model fit indices of the five-factor model in confirmatory factor analysis.

	χ^2/df	GFI	AGFI	RMSEA	NFI	TLI	CFI	PGFI
Initial model	1.423	0.879	0.857	0.041	0.889	0.960	0.964	0.742
Modified model	1.104	0.905	0.887	0.020	0.915	0.990	0.991	0.756
Target value	<2.0	>0.90	>0.90	<0.05	>0.90	>0.90	>0.90	>0.50

GFI: goodness-of-fit index; AGFI: adjusted goodness-of-fit index; RMSEA: root mean square error of approximation; NFI: normed fit index; TLI: Tucker-Lewis index; CFI: comparative fit index; and PGFI: parsimony goodness-of-fit index.

TABLE 5: Discriminant validity ($n = 255$).

	SA	MEC	RI	SDM	Caring
SA	0.751				
MEC	0.600*	0.780			
RI	0.567*	0.600*	0.777		
SDM	0.614*	0.570*	0.604*	0.749	
Caring	0.641*	0.616*	0.513*	0.478*	0.750
AVE	0.564	0.608	0.604	0.560	0.563

* $p < 0.001$; AVE, average variance extracted; SA: self-awareness; MEC: moral ethical courage; RI: relational integrity; SDM: shared decisionmaking. Bold values show the AVE square root in each of the five dimensions.

each item in the questionnaire were consistent. In the retest after a two-week interval, the test-retest reliability of the five factors was between 0.769 and 0.878, which was consistent with the Giordano-Mulligan results [24] between 0.780 and 0.880, showing good measurement stability.

This study carried out seven iterations of EFA, resulting in the extraction of five factors: self-awareness, moral ethical courage, relational integrity, shared decision making, and caring. These factors collectively accounted for 82.629% of the total variance of the questionnaire, and the factor loading of each item exceeded 0.4, indicating consistency with the original instrument structure. However, the initial predefined model did not achieve the desired fit during CFA, possibly due to correlations between items [34]. Consequently, the model underwent a progressive revision based on correction index suggestions, including the addition of four residual paths to improve statistical fitness. The four residual paths added indicate that certain items could not be fully explained by their respective latent variables. For example, the residual paths between item 23 and item 19 and between item 23 and item 22 indicate associations beyond the latent variables of “shared decision making” in the work, possibly involving other factors. This variation may be attributed to cultural differences in the interpretation of the questionnaire items. In individualistic cultures such as the United States, personal viewpoints and active participation in management decision making are valued, whereas collectivistic cultures such as China emphasize deference to leadership decisions [35, 36]. Additionally, the presence of residual paths between item 12 and item 13 and between item 15 and item 16 suggested the involvement of additional shared factors beyond “relational integrity.” This may be due to the proficiency of Chinese nurse staff in building relationships, as they are adept at quickly establishing strong personal connections with leaders and cultivating common interests [37], thus experiencing greater influence from nurse leaders. The modified model incorporates these residual paths, offering a more accurate representation of the structure of the sample data. The

modified chi-square degrees-of-freedom ratio of 1.131 meets the stricter fit criterion of less than 2 and surpasses the Giordano-Mulligan index results [24]. Although the adjusted goodness-of-fit index (AGFI) did not reach the optimal fit index, probably due to the limitation of the sample size, it was close to 0.9, which remained acceptable. AGFI is calculated from the goodness-of-fit index (GFI) and is generally less than the estimate of GFI [34]. In this study, the GFI met the criteria, and the other fit indicators met the needed standard. Therefore, in general, the modified five-factor model was in good fit with the sample data and matched the theoretical design of the original instrument.

In terms of content validity, the expert base information, qualification, and consultation process ensured the validity of the CVI evaluation. Following a single round of expert consultation, the C-ANLQ met the criteria of S-CVI/Ave > 0.90 and I-CVI > 0.78 , demonstrating its good content validity. The scores between the four dimensions of the C-ANLQ and the four dimensions of the ALQ showed a significant positive correlation, aligning with the findings of Giordano-Mulligan [24]. Furthermore, a newly identified factor, “caring,” pertains to authentic leaders’ willingness to serve others and demonstrate concern for the well-being of their followers [38]. Such leaders possess self-transcendent values and exhibit heightened levels of compassion. In this study, caring exhibited significant positive correlations with the total ALQ score and its four dimensions, with correlation coefficients of 0.696, 0.661, 0.663, 0.586, and 0.641 (all $p < 0.001$). This may be attributed to the fact that nursing, as a caring profession, plays a crucial role in the perception of AL from nurse leaders. This statement is in line with the ANLQ conceptual framework [38] in which caring is a natural attribute. Therefore, these results showed a promising correlation between the C-ANLQ and ALQ, with good criterion validity.

Regarding convergent validity, all five latent variables exhibited a composite reliability greater than 0.7, which determined the good inherent quality of the model. The AVE

exceeded 0.5, suggesting that the latent construct accounted for at least 50% of the indicator variance [34]. Additionally, the standardized factor loading of each item surpassed 0.5, indicating a good model fit [31]. Collectively, these findings support the strong convergent validity of the latent construct. For discriminant validity, the square root of the AVE for each of the five dimensions exceeded the correlation coefficient between that dimension and the others. This observation indicates good discriminability among the five dimensions and validates the presence of distinct constructs within the C-ANLQ. Therefore, the C-ANLQ can be deemed to possess five dimensions with reasonable discriminant validity.

4.1. Limitations. The survey conducted in this study was limited to tertiary comprehensive hospitals in Henan Province, China, using a convenience sampling method, which might restrict the generalizability of the findings. Future research could encompass a broader range of participants, such as outpatient nurses and those working in sterilization supply centres, and validate the instrument in diverse geographic regions across China. While the C-ANLQ was administered by the researcher in person to minimize the influence of nurse leaders, response bias might still exist due to social expectations, potentially inflating the response scores compared to actual internal scores.

5. Conclusion

This study adhered to systematic guidelines to translate the English version of the ANLQ into Chinese, establishing an expert panel to conduct cross-cultural adaptation and language validation within a Chinese nursing context. The C-ANLQ was subsequently verified as a valid instrument, exhibiting satisfactory reliability and validity through a two-stage survey involving registered nurses.

5.1. Implications for Nursing Management. Nurse leaders hold pivotal roles as primary managers and direct supervisors of nurse staff, exerting a significant influence on work attitudes and behaviours. This study offers nursing administrators a novel and contextually appropriate assessment instrument, the C-ANLQ, to measure nurses' perception of AL, with far-reaching implications for healthcare organizations aiming to foster AL development among nurse leaders. The C-ANLQ serves as a benchmark for nurse administrators and executives when establishing leadership evaluation criteria, designing training programs, selecting new nurse leaders, and conducting performance appraisals. Furthermore, a longitudinal perspective on the enduring impact and growth trajectory of nurse leaders' AL in practice provides valuable insights into the evolution of AL behaviours over time.

Data Availability

The data supporting the results of this study are available from the corresponding author upon reasonable request.

Ethical Approval

The Zhengzhou University Ethics Committee reviewed and approved the study, number ZZUIRB2023-072.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

A Cross-Sectional Survey of Swedish Primary Healthcare Nurses' Discontent With Their Current Job

Elin Karlsson ¹, Nadine Karlsson ¹, Hanna Fernemark ^{1,2}, Ida Seing ³,
Janna Skagerström ⁴, Emma Brulin ⁵, and Per Nilsen ^{1,6}

¹Department of Health, Medicine and Caring Sciences, Division of Health and Society, Linköping University, Linköping SE-581 83, Sweden

²Primary Healthcare Centre, Lamböhov, Linköping, Sweden

³Department of Behavioral Science and Learning, Linköping University, Linköping, Sweden

⁴Research and Development Unit in Region Östergötland, Linköping, Sweden

⁵Unit of Occupational Medicine, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden

⁶School of Health and Welfare, Halmstad University, Halmstad, Sweden

Correspondence should be addressed to Elin Karlsson; elin.a.karlsson@liu.se

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Nursing staff turnover is an increasing problem for healthcare globally. In Sweden, the shortage of nurses in primary healthcare has increased significantly in recent years. This development is alarming because primary healthcare, both in Sweden and internationally, is responsible for a large part of healthcare. The aim of this study was to explore working conditions (change fatigue, leadership climate, and social support from colleagues) and characteristics of primary care nurses who are discontent with their current job, i.e., those with high turnover intentions and poor job satisfaction in Sweden. This was a cross-sectional survey of 466 registered nurses working in Swedish primary healthcare. Data were analyzed using descriptive statistics and logistic regression. The results demonstrate that 21.1% of the responding nurses are discontent with their current job and have considered quitting. Being discontent had significant associations with poor leadership climate ($p < 0.001$), lack of social support from colleagues ($p < 0.001$), change fatigue ($p < 0.001$), poor health ($p < 0.001$), and working more than 40 h per week ($p = 0.02$). The results have implications for how healthcare organizations structure the work of nurses in primary healthcare and how they can attract and retain future staff to these workplaces.

Keywords: change fatigue; job satisfaction; leadership; social support; turnover intentions; work environment; working conditions

1. Introduction

Nursing staff turnover is an increasing problem for healthcare globally. The World Health Organization estimates that there is a global shortage of 5.9 million nurses [1]. In Sweden, the National Board of Health and Welfare has identified a severe national nursing shortage [2, 3], and the demand for nurses in the healthcare system has increased sharply in recent years [4]. The proportion of primary healthcare nurses per 1000 population in Sweden has

decreased since the early 2000s [5]. There are reports that the availability of nurses in primary healthcare does not reach actual needs [6]. This development is particularly alarming as primary healthcare is responsible for a large part of healthcare. Furthermore, primary healthcare in Sweden is expected to take on an important role in the development of an integrated care model to achieve a more holistic form of care to prevent disease, manage chronic conditions, bring care closer to home, and educate the population on better self-care [7].

Nurses leave healthcare for numerous reasons, including dissatisfaction with psychosocial working conditions such as staffing, heavy workload, low wages, poor leadership, lack of recognition, and inadequate authority [8, 9]. Turnover intention is an employee's willingness to voluntarily quit their job [10], and it has been found to correlate with the actual turnover [11]. Studies have shown that the turnover intention is associated with sickness absenteeism, reduced job performance, low work commitment [12], and low job satisfaction [13, 14]. Job satisfaction—i.e., the degree to which an employee enjoys their job or various aspects of their job [15]—correlates with nurses' self-confidence, communication, and mental health [16], as well as with patient care quality [17]. In addition, high job satisfaction is a major contributory factor to the intention to stay in the nursing profession [18, 19].

While nurses can have the intention to leave their jobs, they may still be satisfied with working as a nurse. Thus, they may express a desire to quit their job to look for other employment that can facilitate their personal development and provide better career opportunities. There may also be practical reasons, such as commuting distance or family circumstances. Still, there is a well-established negative relationship between turnover intention and job satisfaction; the more job satisfaction decreases, the more turnover intention increases [20, 21]. Turnover intention is also correlated with numerous factors besides job satisfaction, e.g., sickness absenteeism and reduced job performance [12]. However, the combined measure ascertains that low job satisfaction is a contributing factor to high turnover intention, which is important because job satisfaction plays a crucial role in attracting and retaining quality nurses and preventing the departure of discontent nurses.

Nurses' turnover and job satisfaction may also be adversely affected by many organizational changes that primary care has undergone in recent decades that have made nursing an increasingly complex profession [9]. Aging populations, changing disease patterns, new treatments for diseases, technological advancements (including telemedicine), an increased emphasis on patient/provider relationships based on partnership and mutual empowerment, political reforms, and policy initiatives all place strong demands on primary care organizations and health professionals' capacity to implement change [22–26]. Research has shown that organizational changes are often associated with employees' psychological uncertainty about how the changes will affect them [27–29]. Studies on nurses [30, 31] have shown that workplace changes can lead to change fatigue, which is the overwhelming feeling of stress, exhaustion, and burnout associated with rapid and continuous change in the workplace [30]. It is therefore useful to explore whether change fatigue is more common among nurses who are discontent.

Social support received at the workplace, as well as the level of leadership, are important factors in the work environment that may act as buffers for some of the negative aspects previously described. For example, social support from colleagues in a workplace is an important predictor of increased intention to stay in an organization and in

improved job satisfaction [32]. Other studies on the social support of nurses in primary healthcare demonstrate that an unsupportive clinical environment is associated with lower ratings in quality of care [33]. Social support can be broadly defined as the assistance and protection given by others [34]. Studies have shown that there is a positive relationship between nurses' social support in the workplace and the quality of patient care [35–38]. Similarly, leadership is positively associated with an intention to stay and job satisfaction, respectively [39, 40]. Leadership is defined as the art of influencing others to achieve their maximum potential to accomplish any task, objective, or project [41, 42]. Leadership climate refers to the way employees perceive leadership in terms of the manager's ability to create mutual trust and the emotional tone that characterizes the workplace [43].

Despite their obvious relevance for nursing retention and recruitment, there is limited research on primary care nurses' psychosocial working conditions in terms of turnover intention, job satisfaction, change fatigue, social support, and leadership climate. These issues have been studied primarily in hospital care settings [44]. Turnover intention and job satisfaction have been examined in primary healthcare nurses in Ireland [45], the United States [46], and South Africa [47]; job satisfaction has been studied among Canadian primary healthcare nurses [48]; and turnover intention and professional support have been investigated among primary healthcare nurses in Scotland [49]. No previous study has explored the working conditions and characteristics of primary care nurses who are discontent with their current job. This study combines high turnover with poor job satisfaction in order to examine nurses' discontent with their current job.

This study was developed to address numerous knowledge gaps. The aim was to explore working conditions (change fatigue, leadership climate, and social support from colleagues) and characteristics of primary care nurses who are discontent with their current job, i.e., those with high turnover intentions and poor job satisfaction in Sweden. Two research questions were addressed: (1) What characterize nurses who are discontent with their current job? and (2) How are nurses' discontent with their job associated with background and organizational workplace factors?

The knowledge contribution relates to the combination of variables and the associations between them. Furthermore, this study contributes knowledge about nurses' psychosocial working conditions in primary healthcare. These issues are important, considering that primary healthcare in Sweden and internationally is facing nursing shortages. Knowledge of these issues will be valuable for developing nursing retention and recruitment strategies.

2. Materials and Methods

2.1. Study Setting. This is a cross-sectional questionnaire study of registered nurses working in primary healthcare in Sweden. The Swedish primary healthcare system is divided into 21 different regions (previously known as "county councils") and provides universal coverage for all citizens.

Primary healthcare, often referred to as the “first line” of healthcare, manages a broad range of conditions that do not require specialist healthcare in hospitals or other specialized units, commonly including access to different professionals such as physicians, nurses, occupational therapists, and physiotherapists. In Sweden, primary healthcare consists of both public and private professionals; private professionals can include those with a contract with the region (which provides healthcare at the same costs as public healthcare) or those without regional contracts (which patients pay for themselves) [50].

Primary healthcare in Sweden employs about 25,000 people, and registered nurses make up 43% of the workforce [51]. Nurses are predominantly female. The role of the registered nurse in primary healthcare typically involves tasks such as handling medication, performing different tests on patients, documenting patient records, telephone counseling, and assessing and prioritizing a patient’s need for healthcare. They also have a leading role in structuring nursing work in collaboration with other team members such as assistant nurses.

2.2. Data Collection. An invitation to participate in this study, along with an information letter and a questionnaire, were sent in March 2022 by Statistics Sweden (SCB) to a representative selection of registered nurses working in Sweden. This selection was made in consideration of geographic spread, and the population was identified through the 2020-2021 occupational registry and the national educational registry. The total population consisted of 109,475 registered nurses, and SCB randomly selected a sample of 8000 registered nurses who were invited to answer the survey. The information letter addressed ethical aspects, such as assuring confidentiality and that the respondents accepted participation in the study by answering the questionnaire. The letter also provided information about the study’s aims, and that data collection included both the questionnaire and registry data. Respondents were informed that they could answer the questionnaire either online or by filling out the paper form sent with the invitational letter.

Three reminders were sent by post, and data collection closed in June 2022. In total, 2903 nurses answered the questionnaire, giving a 37.2% response rate. Of the respondents, 75.2% chose to answer the questionnaire online. Most of the nurses responded to the first invitation (33.4% of the total population).

A nonresponse analysis was performed by SCB, revealing that 48 of the nurses lacked a valid postal address or had protected identities, 21 declined participation with no reason given, 1 was prevented from participating (because of either language difficulties or disability), and 3 were labeled as “others” (because the returned questionnaire was unusable for some reason). The remainder of the nurses did not respond, and no reasons were provided.

In this study, we were particularly interested in the working conditions for nurses in primary healthcare; therefore, nurses who stated that they worked in a primary healthcare setting ($n = 466$) were selected. Inclusion criteria

included working in Sweden, being a registered nurse, and stating currently working in primary healthcare.

2.3. The Questionnaire. The questionnaire was developed together with researchers at the Karolinska Institute in Sweden. This questionnaire has been used previously by Hagqvist et al. [52] and the 2022 version included 78 variables focusing on work environment issues. The questionnaire was developed for physicians, registered nurses, and assistant nurses working in various healthcare settings in Sweden. For this specific study, we restricted the analyses to nurses working in primary healthcare settings and chose to include a limited number of variables relating to socio-demographic characteristics, background factors, health-related variables (sickness presenteeism and perceived health), psychosocial working conditions (change fatigue, leadership climate, and social support from colleagues), and work-related outcomes (turnover intentions and job satisfaction).

The questionnaire data were linked to registry data collected from the national population registry for demographic information (age and sex).

2.4. Measures. This study investigated discontent with one’s job. To this end, we created a new variable indicating discontent by combining respondents’ ratings on turnover intentions and job satisfaction. Nurses who both had high rates of turnover intentions and low rates on job satisfaction were included.

We chose to include whether the nurses had a specialist degree, whether they had changed their job in the last 12 months from a region to a staffing agency, their main employer, work experience, whether they were working full or part time, their estimated working hours per week, whether they had a partner, and whether they had children living at home.

Age was categorized into four fairly evenly sized groups, and sex was categorized as male or female. For educational level, we chose to categorize the nurses as either registered nurses or specialist nurses (in which we also included midwives and radiology nurses).

The response options for their main employer were as follows: municipality, region, private employer with public funding, private employer with private funding, public employer, staffing agency, self-employed, or none of these, which included an open text response. These responses were categorized into five categories for this study: municipality, region, private employer with public funding, private employer with private funding, and others (which included the responses with the lowest number of respondents, i.e., those publicly employed, in staffing agencies, those self-employed, and those who answered that none of the response options applied to them). Swedish primary healthcare consists of public actors and two types of private actors: those having a contract with the region which provides healthcare at the same cost for citizens as public healthcare, and those without regional contracts, where the patients pay for the visits themselves [50]. In Sweden, the regions are the largest

employers of healthcare staff, and this was the reference group in our analyses of main employer.

The options for estimated working hours per week were <30 h, 30–35 h, 36–40 h, 41–45 h, 46–50 h, 51–60, or >60 h per week. For this study, we chose to dichotomize at 40 h, dividing the respondent's answers into two groups: ≤ 40 h per week or >40 h per week (as 40 h of work per week is the standard for working full-time in Sweden).

2.4.1. Turnover Intentions. Turnover intentions refer to an employee's willingness or intention to voluntarily quit their job [11]. The turnover intentions among the respondents were measured with one question: How often during the past 12 months have you considered applying for a new job? Five response options were provided on a Likert scale, ranging from *every day* to *never*.

2.4.2. Job Satisfaction. Job satisfaction is defined as the extent to which a person reports overall satisfaction with their work [53]. For this study, job satisfaction was measured with one question: How satisfied or dissatisfied are you with your job? The five response options ranged from very satisfied to very dissatisfied.

2.4.3. Discontent With Current Job. Based on the responses pertaining to turnover intentions and job satisfaction, we created a combined measure in order to investigate the characteristics of the respondents with high turnover intentions and low job satisfaction. The rationale for combining the two variables was to identify nurses who expressed high turnover intentions and low job satisfaction simultaneously, which potentially suggests a stronger predictor of being discontent with their job.

Specifically, we created a category consisting of those who rated their job satisfaction as very dissatisfied, fairly dissatisfied, or neither satisfied nor dissatisfied and rated their turnover intentions as having considered leaving their current work every day, a couple of times a week, or a couple of times a month. This newly created combination variable is referred to as "discontent with current job." From this variable, we aimed to gain an improved understanding of the factors contributing to nurses' turnover and identify potential strategies to address these issues.

2.4.4. General Health. In the questionnaire, the respondents were also asked how they perceived their health in general, rating on a five-point Likert scale ranging from *excellent* to *poor*.

2.4.5. Sickness Presenteeism. Sickness presenteeism is described as "the first cousin of absenteeism that occurs when employees show up for work but because of mental or medical illness do not function productively or perform at 100%" ([54] p. 1).

One question in the questionnaire was used to investigate potential sickness presenteeism: "During the past

6 months, how many days in total have you gone to work when you should have called in sick?" We used three categories: those who stated they had no such days, those reporting 1–5 days of sickness presence, and those with more than 5 days for the past 6 months.

2.4.6. Change Fatigue. Change fatigue is the perception that there are too many organizational changes taking place simultaneously, which may lead to exhaustion and the incapacity to support and adapt to further changes, regardless of whether they may be favorable [30]. The change fatigue scale by Bernerth et al. [27] is a validated measure originally developed to explore the impact of multiple organizational changes on employee's well-being, organizational commitment, and turnover intentions [27]. The scale contains items such as "the number of changes that are carried out in my workplace is overwhelming," "I am sick of all the changes at work," and "I would prefer a period of stability before another change is carried out in the organization."

For this study, the measure was translated into Swedish and subsequently reviewed by bilingual colleagues and validated through a cognitive pretest inspired by cognitive interviewing [55]. This was performed by HF and JS, who tested the translated measure linguistically and semantically on four physicians and two nurses, respectively, who were asked to answer the translated measure while expressing their thoughts and interpretations of the questions out loud. After this, JS and HF discussed the findings together with PN and IS, which resulted in minor revisions and clarifications of a few terms in some of the questions.

The original change fatigue scale uses six items that are measured using a seven-point Likert-like scale ranging from 1 ("strongly disagree") to 7 ("strongly agree") [27]. In this study, the same six items were measured using a five-point Likert scale upon the advice of SCB after scrutinization of the questionnaire and the responses are as follows: (1) "strongly disagree," (2) "disagree," (3) "neutral," (4) "agree," and (5) "strongly agree." Change fatigue scale was calculated as the sum of different items. Cronbach's alpha for change fatigue was 0.96, indicating the internal consistency of the scale.

2.4.7. Leadership Climate. Leadership climate is described as how managers set an emotional tone and create mutual trust within the work environment [43]. Rather than rating one's managers' individual skills as a boss, leadership climate captures one aspect of the psychosocial work environment, thus referring to an organizational level rather than an individual level. This climate was measured with a ten-item instrument [56, 57], including statements such as: "I am clear about what my boss expects of me," "I have sufficient authorization in relation to the responsibility I have," and "my boss encourages me to participate in the arrangement of my work," with five response options ranging from "yes, often" to "no, never" and including the option "not relevant." The leadership climate scale was calculated as the sum of the items of the scale. Cronbach's alpha for leadership climate was 0.88.

2.4.8. Social Support From Colleagues. The respondents rated perceived social support from colleagues with two questions from the Copenhagen Psychosocial Questionnaire, third version (COPSOQIII) measure: If you need it, do you get help and support from your colleagues? A five-point Likert scale was used, ranging from “always” to “never.” Cronbach’s alpha for social support from colleagues was 0.77.

2.5. Data Analysis. When variables in a psychosocial scale (leadership climate, social support from colleagues, and change fatigue) were missing, a total score was calculated for that person if at least half of the questions of the scale were answered, and the missing variables were given the average score of the other variables in the scale [58]. The reliability of the psychosocial scales (leadership climate, social support from colleagues, and change fatigue) was estimated using Cronbach’s alpha internal consistency coefficient.

The distribution of sample characteristics and discontent was estimated for all respondents. Descriptive statistics are presented as frequencies for categorical variables or mean values and standard deviations (SDs) for continuous variables. General health was dichotomized prior to the regression analysis (1 = *good health*, being either “excellent health,” “very good health,” or “good health” vs. 2 = *poor health*, being either “fairly good health” or “bad health”). The psychosocial scales (leadership climate, social support from colleagues, and change fatigue) were standardized with mean zero and SD one and were used as continuous variables prior to the regression analysis.

Logistic regression was used to identify the characteristics of those who had a high level of discontent with their current job. The logistic regression analysis was unadjusted in Model I and was adjusted for all confounders in Model II (sex, age, main employer, working time, general health, change fatigue, leadership climate, and social support from colleagues). Odds ratios (ORs) for high discontent were estimated with 95% confidence intervals. The ORs for discontent with one’s current job are expressed per one SD increase for the psychosocial scales (mean, 0; SD, 1).

Results were considered statistically significant at $p < 0.05$ using two-tailed tests. Statistical analyses were performed using SPSS version 28.

2.6. Ethical Considerations. Study procedures and data collection were performed in accordance with the Helsinki Declaration [59]. Respondents were informed in the letter that participation was voluntary and confidential and that they had the right to withdraw their participation at any time. This study was approved by the Swedish Ethical Review Authority (Dnr 2022-03275-01; 2022-00310-02).

3. Results

3.1. Sample Characteristics. The characteristics of the respondents are presented in Table 1. This study included 466 respondents, mostly female nurses ($n = 447$; 95.9%). About half of the respondents were 50 years or older ($n = 235$;

50.4%). Of those who answered the questionnaire, 71.4% had an additional specialist education. Most respondents were employed in regions ($n = 317$; 68.3%), and 26% were employed in the private sector.

Although 51.6% of all respondents worked part time, 30.8% stated that they worked more than 40 h per week. In terms of general health, the nurses reported adequate health overall; 77.1% reported good, very good, or excellent health. However, regarding sickness presenteeism, 33.7% of the nurses reported being sick at work to some extent over the past 12 months.

The mean score for leadership climate was 30.3 on a scale ranging from 10 to 40, indicating that most of the nurses were fairly content in this regard. The perception of social support from colleagues was rated at a mean of 9.1 on a scale ranging from 2 to 10, which implies a high level of social support from colleagues. The mean score for change fatigue was 17.3 on a scale ranging from 6 to 30. This indicates that change fatigue is a feature experienced by nurses in primary healthcare.

3.2. Discontent With Current Job, Job Satisfaction, and Turnover Intentions. The results for discontent with one’s current job, job satisfaction, and turnover intentions are presented in Table 2. For the primary outcome variable, discontent, 21.1% of the respondents were dissatisfied with their current job and had considered looking for a new job. The characteristics of these nurses and the associations with other variables were explored further through a regression analysis, as shown in Table 3.

3.3. Characteristics of Primary Care Nurses Who Are Discontent With Their Current Job. Crude and multivariable logistic regression models are presented in Table 3. In Model II, ORs are adjusted for all other variables in the table (sex, age, main employer, working time, general health, change fatigue, leadership climate, and social support from colleagues). Significant associations between discontent with one’s current job and the leadership climate were demonstrated, with a positive leadership climate reducing nurses’ discontent (OR = 0.39; 95% CI 0.28–0.55). Similarly, higher ratings for social support from colleagues were significantly associated with a lower score for discontent (OR = 0.52; 95% CI 0.38–0.72) and change fatigue was associated with higher discontent (OR = 2.18; 95% CI = 1.54–3.10). Those who reported working more than 40 h per week were more than twice as likely to be dissatisfied with their current job compared to those who reported working less than 40 h per week (OR = 2.13; 95% CI 1.14–3.98). Furthermore, respondents who reported poor health were almost four times as likely to experience discontent compared to those who reported good health (OR = 3.90; 95% CI 2.03–7.50).

4. Discussion

This study aimed to investigate working conditions (change fatigue, leadership climate, and social support from colleagues) and characteristics of primary care nurses who are

TABLE 1: Characteristics of the survey respondents among nurses in primary healthcare.

Variable	Number	Mean ± SD	Frequency (%)
Sex	466		
Male			19 (4.1)
Female			447 (95.9)
Age	466		
≤40 years			111 (23.8)
41–50 years			120 (25.8)
51–60 years			130 (27.9)
≥61 years			105 (22.5)
Educational level	464		
Registered nurse			137 (28.6)
Specialist nurse			327 (71.4)
Have changed job in the last 12 months from region to staffing agency	464		
Yes			29 (6.3)
No			435 (93.8)
Main employer	464		
Region			317 (68.3)
Municipality			12 (2.6)
Private sector (publicly funded)			92 (19.8)
Private sector (privately funded)			27 (5.8)
Others			16 (3.4)
Working experience as a nurse	466		
<5 years			40 (8.6)
5–10 years			45 (9.7)
10–15 years			87 (18.7)
>15			294 (63.1)
Working full time or part time	465		
Full time			225 (48.4)
Part time			240 (51.6)
Work time/week	465		
≤40 h			322 (69.2)
>40 h			143 (30.8)
Having a partner	466		
Yes			414 (88.8)
No			52 (11.2)
Having children living at home	461		
Yes			253 (54.9)
No			208 (45.1)
General health	463		
Excellent			38 (8.2)
Very good			142 (30.7)
Good			177 (38.2)
Fairly good			78 (16.8)
Poor			28 (6.0)
Sickness presence (in the last 6 months)	448		
None			297 (66.3)
1–5 days			92 (20.5)
>5 days			59 (13.2)
Change fatigue	465	17.3 ± 6.6	
Leadership climate	461	30.3 ± 6.2	
Social support from colleagues	458	9.1 ± 1.3	

Note: When data are missing, the numbers do not sum up to 466 due to internal dropout.

discontent with their current job, i.e., they have both high turnover intentions and low job satisfaction. One in four nurses in primary care in Sweden is discontent with their current job. In terms of turnover intentions, 69.8% of nurses reported that they, to some extent over the past 12 months, had considered getting a new job and 13.8% rated their job satisfaction as being “fairly dissatisfied” or “very dissatisfied.” Nurses who were discontent with their job to a larger

extent reported a poor leadership climate, less social support, more change fatigue, and poorer general health. Our finding suggests the importance of improving working conditions for nurses in primary healthcare in Sweden to increase their job satisfaction and willingness to stay at their current job. While turnover intentions are a proxy measure used to capture the feelings that lead to leaving a job, research shows that turnover intentions are related to an increased

TABLE 2: Descriptive statistics of job satisfaction, turnover intention, and the primary outcome—discontent with current job, among primary healthcare nurses.

Study variables	Number	Frequency (%)
Job satisfaction	463	
(1) Very satisfied		113 (24.4)
(2) Fairly satisfied		236 (51.0)
(3) Neither satisfied nor dissatisfied		50 (10.8)
(4) Fairly dissatisfied		53 (11.4)
(5) Very dissatisfied		11 (2.4)
Turnover intentions (how often during the last 12 months have you considered getting a new job)	463	
(1) Every day		40 (8.6)
(2) Once/a couple of times a week		63 (13.6)
(3) Once/a couple of times a month		73 (15.8)
(4) Once/a couple of times in the last 12 months		147 (31.7)
(5) Never		140 (30.2)
Discontent with the current job	460	
No		363 (78.9)
Yes		97 (21.1)

Note: When data are missing, the numbers do not sum up to 466. Only 460 participants responded simultaneously to the two variables.

probability of actual resignation [11, 60]. In fact, the proportion of permanent staff on the team predicts the likelihood of leave rates [60]. Thus, creating attractive workplaces for nurses is essential to prevent continuous employee turnover that may strain both those who leave and those who remain. Limitations in the working environment for nurses have been increasingly highlighted, with reports of high workloads and excessive administrative work unrelated to patient care [61, 62].

We found that a positive leadership climate was associated with reduced discontent among nurses with their current job. Similar associations have been found in other studies of nurses in primary healthcare [63, 64]. These findings can be related to previous research on managerial leadership and its influence on employees' health and well-being (e.g., [65, 66]). For example, studies show that a supportive and relationship-oriented leadership (e.g., managers who express concern, support, and empathy for their staff) is important for employees' well-being at work, including job satisfaction and work engagement [67]. Nursing management can have a significant impact on the work climate, including improving job satisfaction, employee engagement, retention rates and overall staff well-being. Studies show that transformational leadership in nursing management is linked to higher job satisfaction and lower burnout rates among nurses [68]. Nursing managers who provide support, recognition, and feedback to their staff can boost morale and job satisfaction, thus creating a positive work climate and improving nurse well-being and job performance [69].

Experiencing social support from colleagues was another aspect that our study highlighted as an important factor for lower scores for discontent with one's current job. This finding is also in line with previous research [70–73]. It has been shown that supportive colleagues who respect and trust each other, facilitate work motivation, thus encouraging nurses to remain at work [72, 73]. Other positive work environmental aspects, such as recognition for the work that

the nurses perform and autonomy and flexibility to find creative solutions for patients, can contribute to increased job satisfaction [70] and help prevent burnout [74].

Our study demonstrated that change fatigue and poor health were significantly associated with nurse dissatisfaction with their current job. Research demonstrates that change fatigue is associated with decreased job satisfaction [30, 75], as well as increased turnover and absenteeism among nurses [75]. Thus, perceptions that there have been too many organizational changes are one aspect that may negatively influence the possibility of sustainable nurse retention.

There was a trend in our study toward nurses working in regions being more dissatisfied with their current job compared with those working in municipalities or private practices with public funding. A Swedish report highlighted the difficulty in recruiting experienced professionals and professionals willing to work in the regions [2]. Notably, we found that almost one-third of the nurses in our study reported working more than 40 h per week (the Swedish full-time norm), which was another aspect related to dissatisfaction. More than half of the nurses were supposed to work part-time according to their responses as to whether they worked full-time or part-time. Other studies have demonstrated that overtime work is associated with poor nursing performance and decreased patient safety [61], low job satisfaction [60], and an increased risk that the nurse will be afflicted with occupational hazards and injuries [76].

The findings from this study have policy implications for how healthcare organizations and nursing management structure the work of nurses in primary healthcare, how they can attract staff to these workplaces, and how to facilitate nursing retention. High turnover rates may be harmful to healthcare quality if skilled nurses often leave, and nursing staff includes a high proportion of novices. Nurses' working environment affects the quality of care that they provide to their patients [77]; thus, the quality of their work environment may also affect patient safety. Ensuring that nurses

TABLE 3: Logistic regression of discontent with the current job among nurses in primary healthcare.

Variables	Model I (crude)			Model II (multivariable)		
	OR	95% CI	p value	OR	95% CI	p value
Sex						
Male	1			1		0.888
Female	1.45	0.41–5.06	0.565	1.120	0.23–5.42	
Age						
≤40 years	1			1		
41–50 years	0.60	0.32–1.11	0.100	0.45	0.20–1.05	0.066
51–60 years	0.64	0.35–1.16	0.137	0.34	0.15–0.78	0.011
≥61 years	0.50	0.26–0.98	0.043	0.25	0.10–0.66	0.005
Main employer						
Region	1			1		
Municipality	0.26	0.03–2.07	0.205	0.25	0.03–2.25	0.218
Private (publicly funded)	0.24	0.11–0.54	<0.001	0.25	0.09–0.75	0.013
Private (privately funded)	0.66	0.24–1.80	0.416	1.05	0.26–4.16	0.948
Others	0.67	0.19–2.41	0.539	0.84	0.10–7.22	0.877
Work time/week						
<40 h	1			1		
>40 h	2.67	1.68–4.24	<0.001	2.13	1.14–3.98	0.018
General health						
Good health (excellent, very good, or good)	1			1		
Poor health (fairly good or bad health)	4.42	2.71–7.19	<0.001	3.90	2.03–7.50	<0.001
Change fatigue	2.48	1.89–3.24	<0.001	2.18	1.54–3.10	<0.001
Leadership climate	0.32	0.24–0.42	<0.001	0.39	0.28–0.55	<0.001
Social support from colleagues	0.44	0.35–0.56	<0.001	0.52	0.38–0.72	<0.001

are willing to remain at their workplace and their profession is essential for patient safety and to meet healthcare needs [78]. This is a pressing issue and a challenging task for healthcare organizations and decision-makers. What we do not know, and thus could be of interest to explore further, is what “solutions” for the sustainable retention of nurses are used in practice and considered beneficial for improving their psychosocial working conditions. Specifically, future research is needed on organizational key achievements rather than interventions at the individual level.

There are several methodological issues to consider when interpreting the findings. We used a quantitative research method for this study. The aim was to investigate a population of nurses at one particular point in time, which made a cross-sectional survey appropriate. This type of research makes it possible to reach many individuals in a short time in an inexpensive manner. However, it does not allow for causal inference, as cross-sectional studies can only point to statistical associations between variables [79]. Another limitation was the relatively low response rate and the inability to analyze nurses' reasons for not participating. This means that the generalizability of the findings is somewhat restricted. SCB distributed the questionnaires and provided the researchers with a technical report, including a dropout analysis for the full sample, including nurses in all types of settings—not solely primary healthcare. The response rate for the questionnaire among these nurses was 37.3% (2903 participating respondents). A comparison to the target population showed that there were relatively more nurses born in Nordic countries or with a Swedish background among the survey respondents and that respondents tended to be a little older than the target population and were less likely to be newly graduated nurses.

We lack information about how many primary healthcare nurses were included in the total population. Therefore, we do not know the response rate for this group. However, there are no indications that nurses in primary healthcare would be either more or less likely to answer a questionnaire on psychosocial working conditions than nurses in other settings. As in most research, there is a risk that those who participate are the ones most interested in the topic or most capable of responding. Research has established that more motivated and opinionated people are more likely to respond to surveys [80] and that a lack of motivation, high workload, bad timing, and inaccurate addresses may cause dropouts and nonresponses [81]. Hence, it is plausible that the respondents in this study were either more positive or more negative to the issues we investigated.

Furthermore, the sex distribution in this study is overrepresented by female respondents. However, this is not surprising because the healthcare sector, and nursing in particular, is heavily dominated by females [82]. In 2022, 87% of the nursing population in Sweden were women [82]. Other sampling strategies and analytical methods are required to obtain a clearer gender perspective and to compare the perceptions of male and female nurses. This was not the purpose of the current study but might be of interest in future studies.

In terms of generalizability, we can conclude that the findings of this study are in line with previous research within this area. However, the Swedish healthcare system is part of a comprehensive welfare system with universal coverage for all citizens, i.e., it provides care to anyone in need of it. This might lead to other types of demands on nurses as citizens in Sweden might be more prone to seeking care. Thus, our findings may to some extent be less generalizable to countries with other types of welfare systems, such as the American liberal system in which the state emphasizes the individuals' responsibilities and the need for private health insurance is greater. Although this was not a comparative study between systems or countries, nurses' working conditions may differ depending on which system they work in, and the generalizability of our study's findings, therefore, is mainly related to similar comprehensive healthcare systems.

5. Conclusions

In conclusion, this study found that nurses' discontent with their current job (i.e., high turnover intentions combined with low job satisfaction) is associated with the leadership climate, social support from colleagues, working more than 40 h per week, change fatigue, and poor health. Specifically, experiencing poor health, change fatigue, or working more than 40 h per week were associated with being more discontent, while the perception of a good leadership climate and supportive colleagues were associated with decreased rates of discontent. The retention and recruitment of nurses in primary healthcare are essential to ensure stability in the movement of personnel and to prevent the need for nurses to work more than 40 h per week, which in this study turned out to be associated with discontent.

This knowledge may facilitate the identification of potential problems in need of solutions that could benefit nurses in terms of improved working conditions, patients in terms of potentially increased quality of care, and organizations who are interested in strategies for retaining their staff at work.

Data Availability Statement

The questionnaire data used in this study are restricted by the Swedish Ethical Review Authority in order to protect patient privacy. Furthermore, the respondents have consented to participate in studies conducted by this research group, and we thus lack their consent to share the data.

Disclosure

The funders have not been involved in the performance of the study.

Conflicts of Interest

The authors declare no conflicts of interest.

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Review Article

Delivering Patient Education in Healthcare Organizations: An Integrative Review of the Nursing Administrative Actions

Elina Linnavuori ¹, Saija Inkeroinen ¹, Anna Kostylev,¹ Mariella Seel,²
Milka Virmajoki,¹ Heli Virtanen ¹ and Helena Leino-Kilpi ^{1,3}

¹Department of Nursing Science, University of Turku, Turku, Finland

²Department of Evidence-Based Medicine and Evaluation, University of Krems, Krems, Austria

³Turku University Hospital, Turku, Finland

Correspondence should be addressed to Elina Linnavuori; melinn@utu.fi

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Aim. To analyze the literature on nursing administrative actions related to patient education to inform healthcare organizations for the development of patient education and identify the knowledge gaps for future research. *Background.* Patient education is a patient's right, yet numerous organizational factors can hinder the effective delivery of patient education. Nursing administrative actions can mediate these factors, but little is known about nursing administration in patient education. *Evaluation.* A systematic integrative review was conducted in October 2022 on five databases (CINAHL (Ebsco), PubMed, Web of Science, ABI/Inform, and Business Source Complete). No time limitations were set. Empirical research articles reporting nursing administrative actions related to educational actions as a main topic were screened and evaluated. The data analysis was based on a constant comparison method. *Key Issues.* There were 3,110 studies identified, of which five quantitative and four qualitative studies were included. Three main themes were generated from the data describing nursing administrative actions related to patient education: (1) strengthen the commitment to patient education, (2) ensure the necessary resources for patient education, and (3) enhance patient education policies. *Conclusion.* This review provides insights into nursing administration in patient education, focusing on commitment, resources, and policies. It not only highlights the critical role of nurse administrators but also calls for further research to assess the impact of these actions. *Implications for Nursing Management.* The findings of this review will be useful for nurse administrators by providing knowledge about nursing administrative actions in patient education and underlining the need for them to pay more attention to it. The implications for nursing management also include supporting further research in the field.

1. Introduction

Patient education is a patient's right [1] and is essential for supporting the empowerment of people in promoting their health and managing their health problems. Patient education is both an "art" and a "science," meaning it is nuanced and evidence-based, and a component of high-quality care [2]. Even though education is considered a core activity of nursing, executing excellent patient education may be demanding due to the need for a comprehensive and patient-centered approach, incorporating both the "art" and "science" aspects [2]. Patient education is described as a process

focusing on both teaching and learning [3]. Terms related to patient education have been identified in the nursing literature despite some differences in these terms, for example, patient teaching, health education [3], health information, counseling, and health promotion [4]. On this basis, we use the term patient education in this review, but the study also considered other terms in the literature search phase, recognizing their interchangeable use with patient education.

A variety of organizational factors have been identified that should be improved in the delivery of patient education [5, 6]. For example, nurses have reported inadequate organizational support, unclear job descriptions [6], and a lack

of resources and time [5]. These studies discuss the important role of the nursing manager in supporting patient education. Recently, practice standards have been developed for patient education in nurse-led clinics, and several of these statements address management's role in patient education [7]. Despite the importance of organizational factors and managerial support for patient education, little is known about nursing management in this core activity of nursing.

Administrator refers to a person who is responsible for carrying out the administration of an organization [8]. In the context of healthcare, the American Nurses Association (ANA) [9], for example, defines a nurse administrator as a person "who orchestrates and influences the work of others in a defined environment, most often healthcare-focused, to enhance the shared vision of an organization or institution" (p.3). Administrators can work at different administration levels of the organization [10]. Administrators at the first and middle levels oversee clinical units at the microlevel, while administrators at the executive level handle top-level patient care administration [11]. There is variation in the international literature on the titles of nurse administrators because of differences in healthcare systems. These titles include nurse manager, ward manager, charge nurse, head nurse, nurse director, supervisor, and nursing officer [12]. In this review, we use the term nurse administrator to cover all these different level administrators in the organizations, assuming their importance for patient education.

Nurse administrators' responsibilities include aspects of both leadership and management which often overlap, such as human resource management, collaboration, nursing development, financial management, and planning and evaluation of actions [13]. Several different leadership styles can also be identified in the work of nurse administrators [14]. In this review, we use the term nursing administration to include both leadership and management. The role of the nurse administrator is important for patient safety and quality of care [15]. It also influences missed nursing care [16]. The work of nurse administrators has an impact on the whole nursing process. Nurse administrators play a crucial role in patient education, and systematic research is required to identify the administrative actions relating to patient education.

2. Aim

The aim of the study was to analyze the literature on nursing administrative actions related to patient education to inform healthcare organizations about the development of patient education and identify the knowledge gaps for future research.

The research questions were as follows:

- (1) What are the nursing administrative actions related to patient education?
- (2) What is the quality of the studies on the nursing administrative actions related to patient education?

3. Methods

3.1. Design. The study design is a systematic integrative review. A guideline by Whittemore and Knafl [17] for the integrative review was followed and complemented by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [18] according to the protocol [19].

3.2. Literature Search. The search was guided by the aim and research questions. Predefined inclusion and exclusion criteria related to the topic of interest, research design, and language were followed throughout the literature search process (see Table 1).

The search was completed on 17 October 2022 on five databases: CINAHL (Ebsco), PubMed, Web of Science, ABI/Inform, and Business Source Complete. Furthermore, the reference lists of the included reports were examined by two researchers. The search terms were formulated based on the PICO framework: the population was administrators, the interest was patient education, and the context was nursing. A wide range of related keywords were used to obtain comprehensive information on the topic. The search strategy was based on the eligibility criteria and revised for each database (Table 2). The search was limited to the English language in all databases. Where possible, only peer-reviewed reports were included (i.e., in CINAHL, ABI/Inform, and Business Source Complete). There was no time limit for the inclusion studies. Prior to the systematic search, the research team repeatedly tested and revised the search strategy in close collaboration with an information specialist at the University of Turku.

The reports were transferred, and the duplicates were removed in the reference management software Zotero, Corporation for Digital Scholarship (version v6.0.15). Two researchers screened each record independently (title, abstract, and the full text). Any disagreements between screeners were resolved in discussions with the research team.

3.3. Data Analysis. The data analysis was based on a constant comparison method consisting of four steps as reported by Whittemore and Knafl [17]. The analysis was performed using the Methods and the Results sections of the studies. First, in the data reduction, one researcher collected the data from the included reports in a data extraction table, which included information about the author(s), year of publication, title, location, study design, the purpose of study, sample, context, data analysis, and results. Next, each study was examined for sentences and phrases describing the administrative actions in patient education in the context of nursing from the perspectives of different data sources, such as head nurses, supervisors, and nurses. Administrative actions related to patient education delivered by physicians were not included. The actions identified were extracted

TABLE 1: Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
The main topic of the report is nursing administrative actions related to educational actions	The main topic of the report is nurse administrator-developed or researched patient education (but not nursing administrative activities)
Educational actions are connected to health individual or group health education or promotion	Health promotion at the population/community level
An international scientific peer-reviewed report	Not scientific peer-reviewed report, e.g., conference abstracts, theses/dissertations, editorials, and letters
Empirical research report	Discussion/theoretical papers and literature review
The full text is available	
English language	

TABLE 2: An example of the search strategy (PubMed).

(“Health Education” [Mesh] OR “Health Promotion” [Mesh] OR “Consumer Health Information” [Mesh] OR “Patient Education as Topic” [Mesh] OR “Counseling” [Mesh] OR “health education” [tw] OR “patient education*” [tw] OR “patient-educat*” [tw] OR counseling [tw] OR counseling [tw] OR “health information*” [tw] OR “health promoti*” [tw] OR “patient guidance” [tw] OR “patient information” [tw] OR “patient teach*” [tw] OR “treatment information” [tw] OR “health advice” [tw]) AND (“Nurse Administrators” [Mesh] OR “Nursing Administration Research” [Mesh] OR “Nursing, Supervisory” [Mesh] OR “nurse leader*” [tw] OR “nursing leader*” [tw] OR “nurse manager*” [tw] OR “nurse management*” [tw] OR “nursing management*” [tw] OR “nurse executive*” [tw] OR “nurse administrator*” [tw] OR “nursing administrator*” [tw] OR “head nurse*” [tw] OR “nurse supervision” [tw] OR “nursing supervision” [tw])

verbatim from each of the studies. The collection process was guided and monitored by the research team. Subsequently, data were organized and coded into a data display matrix. Data comparison was conducted by comparing and grouping coded phrases of nursing administrative actions related to patient education based on similarities of actions. The codes were gradually clustered into subthemes and finally merged into overall main themes [17].

Data quality was assessed independently by two researchers using the Joanna Briggs Institute Critical Appraisal Tools [20, 21]. The appropriate tool was chosen based on the study design of each report (Checklist for Analytical Cross-Sectional Studies or Qualitative Research). Any disagreements in data evaluation were resolved by the research team. No report was excluded based on the data evaluation.

4. Results

There were 3,110 studies identified from five databases and 408 studies from citation searches. After the removal of duplicates, 2,424 studies were screened for eligibility. The title screening process excluded 2,133 studies, 295 studies were retrieved first at the abstract level, and 55 studies were retrieved in full text. Finally, nine studies focusing directly on nursing administrative actions related to patient education met the inclusion criteria (Figure 1).

4.1. Characteristics of the Included Studies. The nine selected studies were published between the years 2001–2019. Five studies used a descriptive cross-sectional design [22–26], and four used qualitative designs [27–30]. The study’s characteristics are presented in Table 3.

The studies were conducted in five different countries: Four in Iran [22–25, 27], two in Sweden [24, 28], one in Finland [26], one in the Netherlands [28], and one in the United States [29]. Most of the studies ($n = 7$) had a hospital environment as the study setting [22–25, 27, 28, 30]. Other study settings were adult acute psychiatric hospitals [26] and telephone advice nursing services [29], and one study was set in primary and municipal care, in addition to hospitals [24].

Nursing administrative actions related to patient education were identified from different perspectives. In most of the studies ($n = 8$), the respondents were administrators: nursing managers, head nurses or supervisors [22, 23, 25, 26, 28, 29], or patient education officers [30]. Four of these studies also included other respondents, such as nurses ($n = 3$) [25, 27, 29], documents, and websites [30]. One study reported exclusively nurses

as respondents [24]. In some of these studies, the respondents also included patients [25] and physicians [25, 29]. However, the patients’ and physicians’ perspectives did not directly describe the relation between nursing administrative actions and patient education by nurses, and their perspectives have, therefore, not been taken into account in the final analysis of this review.

Information on nursing administrative actions related to patient education was collected through questionnaires [22–26, 29], interviews [25, 27–30], and observations [27] of respondents. In addition, websites and documents were analyzed [30].

4.2. Quality of the Selected Studies. Based on our quality assessment [20, 21], the quality varied among both cross-sectional and qualitative study designs (Table 3). Most commonly, there were disparities in reporting in terms of strategies to deal with confounding factors [22, 23, 25, 26] and criteria for inclusion in the sample [23, 25, 26]. All qualitative studies lacked a statement of the researcher’s cultural or theoretical location [27–30]. One qualitative study clearly reported a philosophical perspective [28].

4.3. Nursing Administrative Actions Related to Patient Education. As a result of the analysis, three main themes describing nursing administrative actions related to patient education were identified: (1) strengthen the commitment to patient education, (2) ensure the necessary resources, and (3) enhance patient education policies. Each main theme includes several subthemes, identified from three different perspectives: nurse administrators, nurses, and policy papers. Main themes, subthemes, codes, and original phrases describing nursing administrative actions related to patient education are presented in Table 4.

The main themes ($n = 3$), subthemes ($n = 9$), and different perspectives are described below in detail. For each theme, the different perspectives are presented in order: first, the nurse administrators’ perspectives, followed by the perspectives of other respondents such as nurses, or if the respondents were not specified in the study, as a common opinion.

4.3.1. Theme 1: Strengthen the Commitment to Patient Education. The first theme describes nursing administrative actions to strengthen the commitment to patient education including three subthemes: enhancing motivation for patient education [22, 27, 29], prioritizing patient education

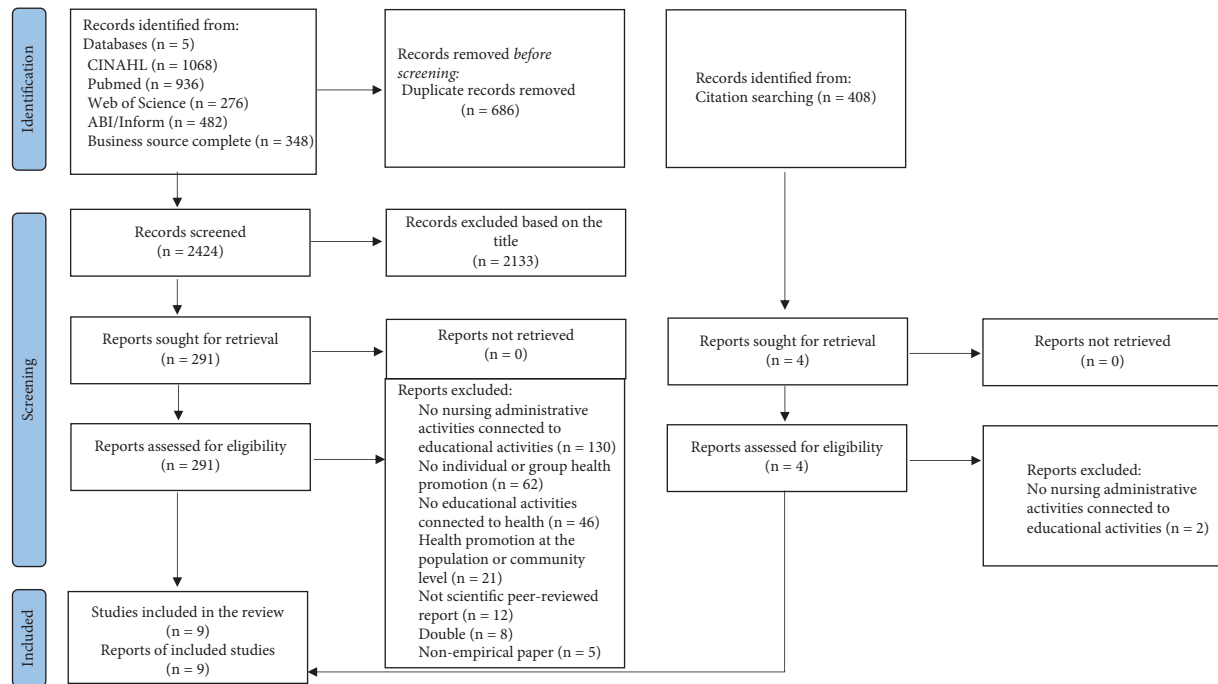


FIGURE 1: PRISMA flow diagram [18].

[25, 27], and providing support [24, 28, 29]. These sub-themes describe the strengthening of nursing, administrative, and organizational commitment to patient education in terms of reported development targets, lacking issues, and important aspects.

(1) *Enhancing Motivation for Patient Education.* Nurse administrators should develop factors that motivate nurses to overcome the obstacles of patient education [27]. Nurse administrators assessed that the most important factor in forming motivation was to improve nurses' mentality and motivation [22]. When asked about educational barriers, nurses reported that managers should appreciate nurses' efforts in patient education [27] and provide feedback [27, 29].

(2) *Prioritizing Patient Education.* Patient education was not given enough attention by nurse administrators. However, both nurses and managers stated that everyone within an organization needs to actively participate in patient education and that patient education should be a priority [27]. Some nurses agreed that if managers did not value patient education, nurses should not be so concerned about it either [25].

(3) *Providing Support.* Nurse administrators reported the importance of helping new nurses with patient education [28]. According to nurse administrators, the most important factor in engaging nurses in patient education was utilizing nurses' suggestions for patient education [22]. Nurses' perceptions of managerial support for patient education include managerial consultation, valuing and supporting the nurses' advisory role [29], and interested and involved managers [24].

4.3.2. *Theme 2: Ensure the Necessary Resources for Patient Education.* This theme describes nursing administrative actions to ensure all the necessary resources in patient education in three sub-themes: creating facilities for patient education [22, 27, 28, 30], managing human resources [22, 25, 26, 28], and educating and training [26, 27]. In the next paragraphs, these sub-themes will be described in detail: first, how nurse administrators saw themselves, second, highlighting the problems related to patient education, and third, what was seen as important for nurses.

(1) *Creating Facilities for Patient Education.* Nurse administrators saw their responsibility as creating facilities for nurses to provide patient education, such as providing space for education and access to the Internet [22, 28], and introducing standard forms for patient education [22]. Designing appropriate forms was seen as improving patient education [27]. Creating facilities for patient education also includes budgeting, where nurse administrators experience powerlessness in explaining deficits to their superiors [28]. Also, nurses reported that having designated facilities and rooms for patient education would enhance its effectiveness [27].

(2) *Managing Human Resources.* Human resource management was highlighted as a problem related to patient education by nurse administrators. They described situations of understaffing and tight work schedules that they had to manage [26–28]. Most of the nurse administrators still assessed that requesting nurses to provide patient education is realistic [25]. Establishing coordination in relationships and coordination of educators was assessed as an important task of the nurse administrators' role in patient education

TABLE 3: A summary of the selected studies ($n = 9$).

Author(s), year of publication, and location	Purpose of the study	Sample, sample size, and sampling method	Study design and data collection	Context	Data analysis	Quality scores (JBI 2020, critical appraisal tools)
Fereidouni et al. 2019, Iran [27]	"To document the perspectives and recommendations of nurses with regard to patient education" p.2	Head nurses, $n = 8$, clinical nurses, $n = 16$, and purposive sampling	A qualitative exploratory design semistructured in-depth interviews focus group observation	Medical, surgical, emergency, and pediatric departments	Conventional content analysis (Graneheim and Lundman 2004)	7/10
Ghorbani et al. 2019, Iran [22]	"To determine the mechanisms for attracting nurses" for attracting nurses" engagement in patient education from the viewpoint of nursing managers" p.164	Nursing managers (ward head, supervisor), $n = 91$, convenience sampling	A cross-sectional descriptive-analytic study A two-part questionnaire (developed for this study) (40 questions)	Educational hospitals	Descriptive statistics methods	7/8
Bergh et al. 2015, Sweden [28]	"To explore the conditions for nurses' daily patient education work by focusing on managers' way of speaking about the patient education provided by nurses in hospital care" p.192	Managers, $n = 10$	A qualitative exploratory design (i) A social constructionist perspective 3 focus group interviews	Not specified, patient education in hospital care	Critical discourse analysis	9/10
Seyedin et al. 2015, Iran [23]	"To investigate the dimensions of patient education process including need assessment, planning, implementation, and evaluation" p.2	Head nurses, $n = 187$, convenience sampling	A descriptive cross-sectional study A questionnaire (developed for this study) (i) 1 part: demographics, (ii) 2 part (31 items) a five-point Likert scale (1 = never and 5 = always)	Teaching hospitals	Descriptive statistics methods	4/8
Bergh et al. 2012, Sweden [24]	"To describe nurses' perceptions of conditions for patient education, focusing on organizational, environmental and professional cooperation aspects" p.759	Nurses, $n = 701$, stratified random sample	A cross-sectional survey A questionnaire (developed for this study) (60 items) with fixed response categories (1-5) dichotomous response options (yes or no) open-ended answers	Primary care, municipal care, and hospital care	Quantitative data: statistics methods Qualitative data: a content analysis	8/8
Vafae-Najar et al. 2012, Iran [25]	"Studying what patient education services were offered and which organizational factors in the hospitals affected the provision of these services" p.231	Patients, $n = 441$, physicians, $n = 200$, nurses, $n = 185$, supervisors, and managers, $n = 70$, stratified and simple sampling	A descriptive cross-sectional study of four self-administered questionnaires Three answer choices (agree, disagree, and neutral) open-ended questions and closed questions interviews	Teaching hospitals	Quantitative data: statistics methods Qualitative data: a content analysis	2/8

TABLE 3: Continued.

Author(s), year of publication, and location	Purpose of the study	Sample, sample size, and sampling method	Study design and data collection	Context	Data analysis	Quality scores (JBI 2020, critical appraisal tools)
Hätönen et al. 2010, Finland [26]	"To describe patient education practices in adult acute psychiatric hospitals" p.334	Head nurses from adult acute psychiatric wards, <i>n</i> = 55	A descriptive questionnaire survey A questionnaire (developed for this study) 7-point scale dichotomous response options (1 = yes or 2 = no) open-ended question	Adult acute psychiatric hospitals	Quantitative data: statistics methods Qualitative data: a content analysis	6/8
Valanis et al. 2003, U. S [29]	"Describes observed variations in telephone advice nursing services and the organizational and process factors the nurses identified as supporting or hindering their work" p.216	Taped (1 to 2 hours) calls: call centers, <i>n</i> = 77 medical offices, <i>n</i> = 98, nurses and physicians, (<i>n</i> = not reported), managers, (<i>n</i> = not reported), a convenience sample	A qualitative design Two instruments (developed for this study) (i) The call description form (ii) The interpersonal communication manager-completed checklists focus groups (nurses and physicians)	Telephone advice nursing services	Qualitative analysis	5/10
Albada et al. 2001, Netherlands [30]	"Describes the organization of patient education in hospitals and the conditions that influence this in the Netherlands, Flanders and England" p.4	Patient education officers, an executive of a health insurance company, Ombudsman, a committee member of a professional organization, <i>n</i> = 5, document analysis, <i>n</i> = 95, documents and websites, <i>n</i> = 24	Qualitative design document analysis of five interviews	Not specified, patient education in hospitals	Text coding analysis document analysis	5/10

TABLE 4: Main themes, subthemes, codes, and original phrases describing nursing administrative actions related to patient education.

Subtheme	Code	Original phrase	Study
<i>Main theme 1: Strengthen the commitment to patient education</i>			
Enhancing motivation for patient education	Developing factors that motivate nurses	<p>“To overcome the obstacles of patient education, total commitment is necessary. Nurses must be fully willing to devote the necessary time and energy to patient education and believe in it. Thus, administrators should strengthen institutional commitment by developing motivational factors and facilitating change by every impetus to achieve this milestone.” p.4</p> <p>“Regarding motivation, the most important factor from the viewpoint of head nurses was forming motivation to follow the policy and teaching methods to the patient.” p.166</p> <p>“Regarding motivation, the most important factor from the viewpoint of supervisors was Improving the mentality and motivation of nurses.” p.166</p>	Fereidouni et al. 2019
	Motivating nurses	<p>“In another case, a participant stated that ignoring the nurses who enroll eagerly in patient education is not reasonable. Managers should appreciate their efforts, even with a smile or other acknowledgment.” p.4</p>	Ghorbani et al. 2019
	Improving nurses' motivation	<p>“Nurses indicated they did not receive feedback on advice appropriateness and that feedback on caller outcomes would be more helpful than the monitored service indicators.” p.220</p>	Ghorbani et al. 2019
	Appreciating nurses' efforts in patient education	<p>“12.2% of the nurses agreed with the viewpoint that if the managers did not consider patient education to be an important factor they should also not be so concerned about it.” p.234</p> <p>“The participants stated that all stakeholders should consider patient education a priority and take measures toward improving education. One participant mentioned: “A lasting change requires a general determination. All people in the organization from the top of pyramid to its base should actively participate.” p.4</p>	Fereidouni et al. 2019
	Improving patient education motivation and performance	<p>“The observations also revealed that these supervisors did not pay attention to patient education in their rounds and did not consider this domain to be a priority. The following field note showed that practical involvement of the supervisors was not sufficient.” p.4</p>	Fereidouni et al. 2019
Prioritizing patient education	Focusing on patient education	<p>“71.4% believed that due to the nurses' workload in each division, patient training would only be possible if special staff were dedicated to it.” p.234</p>	Vafaee-Najar et al. 2012
	Dedicating special staff to patient education	<p>“It's important that managers have an opportunity to help young nurses instead of being overwhelmed by administrative tasks—we're the ones who should help them. Patient teaching takes time, thus it's a question of where we're going to find the time.” p.194</p>	Bergh et al. 2015

TABLE 4: Continued.

Subtheme	Code	Original phrase	Study
Supporting patient education	Leveraging nurses suggestions for patient education	<p>“Using nurses’ constructive and effective suggestions for patient education, from the viewpoint of supervisors” p.166</p> <p>“Nursing personnel complained about their authority and decision making in hospitals. “Favoritism is corrosive. Desecration, discrimination, lack of authority, and professionalism are disappointing in our hospital. First of all, we should strengthen our profession and define our territory by choosing a qualified matron, supervisors, and nursing personnel.” p.4</p>	Ghorbani et al. 2019
	Getting interested and involved in supporting patient education	<p>“A total of 214 nurses responded to the supplementary open-ended item regarding perceptions of managerial support in nurses’ PE. Five categories emerged: offer of professional competence development, allocated time, available room for teaching, available working tools and interested and involved managers.” p.761</p>	Bergh et al. 2012
Supporting patient education	Providing consulting options for nurses executing patient education	<p>“One nurse observed that “I am not trained to deal with suicidal patients and yet, after hours, I am the only one available in the system to deal with this member.” Although she did have access to the on-call physician or could refer the patient to outside services, she still felt unsupported. In the medical offices, nurses could consult with an on-site physician, pharmacist, or supervisor.” p.220</p>	Valanis et al. 2003
	Valuing and supporting the nursing advice role	<p>“Nurses expressed varying perceptions of the extent to which the healthcare system valued and supported the nursing advice role. One medical office nurse stated: “I wonder how much advice nurses are actually valued. If there is a staff shortage in the clinic, we are always the first ones pulled.” p.221</p>	Valanis et al. 2003

TABLE 4: Continued.

Subtheme	Code	Original phrase	Study
<i>Main theme 2: Ensure the necessary resources for patient education</i>	Ensuring adequate working conditions	“Managers regarded themselves as responsible for creating the necessary conditions for nurses to conduct their daily work.” p.194	Bergh et al. 2015
	Creating room and facilities	“The importance of barriers to patients’ education, the most important factor from the perspective of head nurses was the creation of facilities and classes for patient education (video-internet-lag).” p.166	Ghorbani et al. 2019
	Facilitating patient education work	“There was a desire for external parties to study the managers’ work situation to help them facilitate nurses’ patient education work: “We’re running around and an outsider would surely ask: Why are you doing that?”” p.196	Bergh et al. 2015
	Providing room to conduct patient education	“We need a quiet room in our wards for patient education to enhance its effectiveness. Concentration in a noisy environment is impossible for patients.” p.5	Fereidouni et al. 2019
	Providing facilities to conduct patient education	“We need some facilities (such as video, TV, video software, and so on) to show various educational films on patient diets and medications while patients are in beds in their own rooms.” p.5	Fereidouni et al. 2019
	Budgeting	“The managers were powerless as professionals in relation to their superiors when budgeting was discussed: “We’re virtually up against the wall when we have to explain our deficits.”” p.196	Bergh et al. 2015
	Implementing standardized patient education forms	“From the viewpoint of head nurses, included introducing standard forms of education to the patient provided by health Ministry (3.88 ± 0.97), while it was being aware of the actual and potential capabilities of nurses (3.91 ± 0.79).” p. 166	Ghorbani et al. 2019
	Designing forms for patient education	“The participants stated that having a specific form for patient education was necessary. They mostly mentioned that the current forms that were used in the hospital were obligatory for patients and quite time-consuming to complete. Thus, they recommended designing appropriate forms to improve patient education.” p.4	Fereidouni et al. 2019
	Developing patient education leaflets	“In Dutch hospitals on the program level of patient education, there are specialized nurses with important roles in patient education for several patient groups. Dutch hospitals have a large number of patient leaflets on treatments that are developed within the hospital.” p.6	Albada et al. 2001
	Managing patient education materials	“Most Flemish hospitals have little organization of patient education on the organizational level. The editing of patient information leaflet is an important activity on the organizational level. This task is generally among the responsibilities of a general communications officer.” p.7	Albada et al. 2001
Developing patient education leaflets	“The hospital developed patient education leaflets for diabetes and cataract patients. Policy on when to give face-to-face information and leaflets is present for education with diabetes patients.” p.7	Albada et al. 2001	

TABLE 4: Continued.

Subtheme	Code	Original phrase	Study
		<p>“Altogether 50 respondents described problems related to patient education on their wards. First, patients’ poor condition in terms of lack of insight and poor motivation was perceived most frequently ($n = 33$) to hinder the patient education. Second, a lack of staff resources ($n = 25$) meant that there was not sufficient staff on the wards and they were not motivated or competent to carry out patient education. Third, the discrepancy in the procedures ($n = 17$) concerned the unplanned and short treatment periods and lack of patient education instructions. Fourth, poor operational conditions ($n = 9$) were described.” p.337</p>	Hätönen et al. 2010
Managing resources and environmental conditions		<p>“A typical description of the connection between available resources and nurses’ patient education work is provided in the following quotation: “It mustn’t cost anything. We struggle with the tight nursing turnarounds where everything has to be done incredibly quickly. We might have to discharge 6-7 patients every day and it’s almost like a conveyor belt, but what kind of information do they get? There used to be a discharge meeting, at which the patient could ask the physician and the nurse questions but that rarely happens today. When the patient asks questions in connection with discharge, the nurse often says—yes but you saw the physician” [in the nurse’s opinion the patient should have asked the physician at the discharge meeting].” p.196</p>	Bergh et al. 2015
Managing human resources	Coping with tight nursing schedules	<p>“17.6% of the managers also believed that “Due to the high volume of responsibilities expected from nurses, requesting them to provide a patient education service is unrealistic.” p.234</p>	Vafae-Najar et al. 2012
Requesting nurses to provide patient education		<p>“Considering the position of participatory management, the most important factor from the perspective of head nurses was the coordination in relationship and coordination of trainers in different shifts.” p.166</p>	Ghorbani et al. 2019
Managing available resources		<p>“Other obstacles to the development of patient education were that nurses often changed workplaces and that available healthcare resources were reallocated and used for training.” p.196</p>	Bergh et al. 2015
Coping with a shortage of nurses		<p>“I think that patient education falls through the cracks due to the high workload in the hospital. The nursing shortage is really a crisis. When I have seven patients in each shift, there is no chance left for patient education.” p.5</p>	Fereidouni et al. 2019

TABLE 4: Continued.

Subtheme	Code	Original phrase	Study
Educating and training new nurses		“Participants stated that newly graduated students were novices and that they started working in hospitals without experience. Thus, these new nurses needed to understand the importance of patient education and be thoroughly trained in this regard. One participant stated, “Frequent in-service education is recommended for nurses to improve their knowledge to educate patients efficiently.” p.5	Fereidouni et al. 2019
		“Less than half of the (45%) respondents reported that the nurses had sufficient professional education to deliver patient education interventions, whereas sufficient on-the-job training for staff had been poorly realized.” p 337	Hätönen et al. 2010
Improving training for staff		“Previously, nurse educators participated in students’ caring activities. Caring conversations created conditions for nurses to reflect over their own care and patient education, thus helping them grow in their profession. The managers stated that it was necessary for nurses to have time for reflection: “to advance from novice to expert” (FG, 2), something that was missing today.” p.196	Bergh et al. 2015
		“Primary care managers offered professional competence development in PE significantly more frequently than in MC/HC.” P. 761	Bergh et al. 2012
Providing opportunities for professional growth			
Offering professional competence development in patient education			

TABLE 4: Continued.

Subtheme	Code	Original phrase	Study
<i>Main theme 3: Enhance patient education policies</i>			
Monitoring and supervising patient education	Giving positive and negative reinforcement	“A head nurse said, “Managers should use carrots and sticks at the same times. Frequent punishment will not work.” p.4	Fereidouni et al. 2019
	Monitoring nursing tasks	“After repeated prompts to provide a more detailed description of the prerequisites for patient education, the managers quickly moved to general descriptions of nursing tasks that have to be monitored, such as documentation and liaison.” p.197	Bergh et al. 2015
	Supervising the process of patient education	“On the other hand, they are the line managers in hospitals who directly supervise the processes; therefore, they know and can judge the process of patient education in their wards.” p.2	Seyedin et al. 2015
	Ensuring quality	“The managers have control over routine matters as well as the power to decide the content, which implies quality assurance.” p.197	Bergh et al. 2015
Monitoring the implementation of patient education	Documenting	“The juridical discourse contained several controlling factors that restricted the nurses’ time available for patient education. By referring to the public regulations in health care, the managers expressed that nurses must exercise control and be controlled. The regulations require documentation. “I’m not exactly terrified but “I have to document everything to cover my back” is frequently heard.” p.197	Bergh et al. 2015
		“The participants acknowledged that including the implementation of patient education in annual personnel evaluations would be effective. Another participant also mentioned that “annual supervision at a specific time is not effective. Supervision should be intrusive and frequent” . p.4	Fereidouni et al. 2019
	Paying attention to how patient education is monitored	“Nurses reported aspects of the practice environment that limited their professional practice, impaired their optimal functioning, and contributed to low morale. These included the extent to which they were required to adhere to protocols, supervisor emphasis on time targets (eg, call time, talk time, and documentation time), and monitoring to ascertain that required questions were asked of all callers.” p.221	Valanis et al. 2003
	Managing operations	“Hence, they expressed a desire to have power to manage operations.” p.196	Bergh et al. 2015

TABLE 4: Continued.

Subtheme	Code	Original phrase	Study
		<p>“Constant changes constituted an obstacle to the development of the patient education provided by nurses, and all professional categories had tasks that were beyond their professional competence. The managers had no time. Only the most important administrative tasks were performed, and the rest were ignored: “It depends on how you sell it and your own opinions. I really resist any change. we’re fire fighters, we only have time to man the ward. We can’t reorganise things and think afresh. We have done that; now we have to reduce the number of tasks” . p.196</p>	Bergh et al. 2015
Reducing the number of tasks of managers		<p>“All of the head nurses mentioned that their job description needed to be revised by their hospitals based on new accreditation criteria. They stated that they were currently busy with the new accreditation criteria and standards, which led to their unintentional neglect of nursing care obligations such as patient education.” p.4-5</p>	Fereidouni et al. 2019
Revising job description	Updating the description of head nurses’ tasks and responsibilities	<p>“Managers commented that patient criticism about not receiving or understanding information would decrease if nurses devoted more time to patient teaching: “They do a whole lot of the physicians” tasks these days. Many physicians don’t prescribe tests—the nurse has to do it in our computer system and decides which tests should be performed. A lot of time is spent changing prescriptions for medications that are completely off the wall. if the nurse didn’t have to do these medical tasks she’d have more time for patient education.”</p>	Bergh et al. 2015
Clarifying nurses’ job descriptions		<p>“Managers commented that patient criticism about not receiving or understanding information would decrease if nurses devoted more time to patient teaching: “They do a whole lot of the physicians” tasks these days. Many physicians don’t prescribe tests—the nurse has to do it in our computer system and decides which tests should be performed. A lot of time is spent changing prescriptions for medications that are completely off the wall. if the nurse didn’t have to do these medical tasks she’d have more time for patient education.”</p>	Bergh et al. 2015

p.197

TABLE 4: Continued.

Subtheme	Code	Original phrase	Study
Developing and implementing policies and procedures	Providing legal and professional information on patient education	“Informing nursing staff on legal and professional issues regarding avoiding education to patients from the viewpoint of supervisors.” p.166	Ghorbani et al. 2019
	Developing education policies	“Policy on face-to-face education is present in Dutch hospitals for some patient groups and is developed in multidisciplinary projects supported by a patient communications officer.” p.6 “Some hospitals have quality projects in patient education. The communications officer is a central person within this network. The coordinating of the network, editing patient leaflets, and coordinating quality projects in patient education are among the responsibilities of the communications officer. Until recently these were the tasks of a patient education coordinator, but this function no longer exists.” p.7 “In 2002, the Law on Patient’s Rights stipulated that every hospital should have an ombuds service [17]. The ombuds services have now been implemented in hospitals. The law also set out guidelines for patient education but these guidelines do not greatly influence practice.” p.7 “Medical Treatment Contract Act (WGBO) has made it the duty of healthcare workers to provide their patients with information [11–13]. This law greatly stimulated the policy and practice of patient education in hospitals and heralded the start of a broad implementation program that focused on informed consent.” p.6	Albada et al. 2001
Developing and implementing policies and procedures	Coordinating projects		Albada et al. 2001
	Implementing ombuds services in hospitals		Albada et al. 2001
	Implementing programs		Albada et al. 2001
Developing and implementing policies and procedures	Lobbying	“This patient organization has a stimulating influence on the organization of patient education through lobbying and quality projects in health care.” p.6	Albada et al. 2001
	Promoting patient education through international organizations	“The World Health Organization (WHO) promotes patient education through the Health Promoting Hospitals project.” “The European Association for Communication in Healthcare (EACH) aims to stimulate research and education on communication in healthcare.” “The European Association for the Study of Diabetes (DESG) provides advice and best practices on patient education in diabetes.” p.8	Albada et al. 2001

[22]. Nurses also reported factors relating to managing resources, and the lack of these was seen as a problem [27].

(3) *Educating and Training for Staff*. Educating and training new nurses was considered vital to improve their knowledge for effective patient education [27]. Nurse administrators reported that on-the-job staff training had been poorly realized [26]. Reflection was also an important part of education: one nurse administrator reported the importance of creating opportunities for nurses to reflect on their own care and patient education to support them grow as professionals [28].

4.3.3. *Theme 3: Enhance Patient Education Policies*. The third main theme was enhancing patient education policies. Patient education policies were divided into international, national, organizational, and program levels [30]. These policies influence nursing administrative actions within an organization. The nursing administrative actions related to this main theme include three subthemes: monitoring and supervising patient education [23, 27–29], revising job descriptions [27, 28], and developing and implementing policies and procedures [22, 30]. In the next paragraphs, these subthemes will be described in detail; first, how nurse administrators supervise patient education, second, what nurse administrators mentioned should be revised, and third, what are the nursing administrative actions at different levels relating to developing and implementing policies and procedures.

(1) *Monitoring and Supervising Patient Education*. Nurse administrators supervise and monitor the patient education process [23, 27–29]. This also includes documentation to meet legal requirements and quality assurance, for which managers are responsible for supervising routine tasks and deciding on content [28]. Nurses reported that patient education requires constant supervision [27], although too much control was also perceived as limiting professional work [29].

(2) *Revising Job Descriptions*. Nurse administrators reported that their job descriptions need revision [27], e.g., by reducing the number of tasks [28], because they did not have sufficient time resources to fulfill their responsibilities [27, 28]. The nurse administrators also described situations where nurses' job descriptions need to be revised. Nurse administrators commented that if nurses had more time for education, the number of patient complaints about patient education would decrease [28].

(3) *Development and Implementation of Policies and Procedures*. Nursing administrative actions at different levels include developing policies for patient education programs and coordinating quality projects in patient education [30]. They also considered providing legal and professional information on patient education as an essential factor [22]. Furthermore, nursing administrative actions include implementing patient education policies, e.g., focusing on

informed consent and promoting patient education through international organizations. At the national level, national laws, policies, and guidelines influence patient education. Centers of expertise and patient organizations influence patient education through quality projects. At the international level, the World Health Organization (WHO) promotes patient education through various projects [30].

5. Discussion

This integrative literature review examined the nursing administrative actions related to patient education, as there is a dearth of research in this area although it is a core nursing activity. The objective was reached, and the review produced information for both purposes: to inform healthcare organizations about the identified nursing administrative actions connected to patient education and to identify knowledge gaps for future research.

Different nursing administrative actions were identified from different perspectives, even though the number of analyzed studies was not very high (nine studies). Three main themes were formed: (1) strengthen the commitment to patient education, (2) ensure the necessary resources for patient education, and (3) enhance patient education policies. These themes highlight the actions corresponding to previous research on the standards developed for patient education [7] and nurse administrators' work content [13]. Additional research is needed on nursing administrative actions of patient education and to explore the connections and outcomes of these administrative actions to support high-quality and sustainable patient education.

Most of the studies focused specifically on the perspective of nurse administrators [22, 23, 25–29] working at the first and middle levels of their organizations; therefore, the identified actions do not necessarily represent all nursing administrative actions of patient education. First- and middle-level nurse administrators provided only a microview of detailed information on administrative actions related to patient education in the organizations. Moreover, the two qualitative studies included in this review showed that these nurse administrators did not always recognize the importance of their role in improving patient education [27, 28] which highlights the need to explore in more detail nurse administrators' experiences of their professional responsibilities concerning patient education. In previous research, nurse managers also find it difficult to express how to support nurses in undertaking fundamental care, possibly because it is overlooked in priorities [31]. The research area, therefore, still has gaps, and further research is needed in the future to synthesize these findings and explore reasons in depth. High-level administrators' actions on patient education need to be explored more, especially as there is a demand for nurses in high-level administration [32, 33]. Future research should take these different levels into account to provide a shared understanding of nursing administrative actions related to patient education. It would also be useful to analyze these different levels of administration actions separately to obtain more detailed practical information on patient

education-related nursing administrative activities in organizations.

In the literature, the nursing administrative actions were not related to patients. For patients, the ethical and often legal basis for patient education is their right to be knowledgeable about their health and care [34], and therefore, for the administration of patient education, patient outcomes should be the main interest in nursing administrative actions and should not be disregarded in future research. In the future, research is needed to explore the connections between nursing administrative actions and patient outcomes. Also, the perspectives of patients about nursing administrative actions on patient education were lacking in the included studies. This may be due to the fact that administrative actions might not be directly visible to patients, although they may have useful views that can be relevant to nursing administration [35]. The importance of the patient's perspective is emphasized especially due to the growing interest in patient and public involvement [36] and administrators' efforts aimed at sustainable and transparent healthcare [37]. Including patients' views could potentially provide information on the outcomes of nursing administrative actions for patients.

Our aim to analyze the nursing administrative actions of patient education also deserves a critical comment. A challenge in the analysis was that the nursing administrative actions of patient education were not always clearly described, but the studies described problems relating to patient education. This was the assumption, and therefore, a broad selection of keywords was used. We tried to reach as wide a range of studies as possible but still did not reach very specific studies on nursing administrative actions related to patient education. Both nurses and nurse administrators describe similar organizational barriers that hinder patient education [22, 24–29]. A common barrier was lack of time [24, 25, 27–29] which has also led to missed nursing care in other studies as tasks with direct patient care have been prioritized over patient education [5, 38]. It is worth noting that nurse administrators experienced the same problems on which they should provide support for their nursing staff. Nurse administrators indicated that there was a lack of time for nurses to provide patient education due to tight work schedules [25, 28]. However, lack of time and constant changes also hinder administrators' work to support patient education [28]. These findings highlight the need for improvement in these areas. Nurse administrators should also be offered support in their work to enable them to act on patient education. The studies identified some actions by nurse administrators to address these issues, e.g., revising job descriptions, but there is still a lack of knowledge on how to solve these issues in more detail.

This integrative review explored comprehensively nursing administrative actions related to patient education. The number of studies on the topic was quite low, which may indicate that patient education has not been identified as an area of nursing administration. Despite the low number of studies, these different designs provide rich information about nursing administration related to patient education. In the future, it would be relevant to explore the actions

identified in this review individually, targeting a specific activity, such as human resource management. It would also be beneficial to explore the connection between administration styles and patient education as it is known that there is a significant correlation between positive leadership styles and nurses' commitment to their work [16]. This could provide information on how to tackle the barriers to strengthening commitment to and ensuring the necessary resources for patient education.

5.1. Limitations. There are some limitations in this review, related to the sample/respondents, analysis of the result, and literature search. Respondents were first- and middle-level nurse administrators in their organizations, which may bias the generalizability of the results. Furthermore, the nursing administrative activities related to patient education were not always clearly described, which may have led to omissions in the analysis. However, this was controlled by monitoring the collection process and by frequent discussions within the research team. In addition, the quality of the included studies varied, and no report was excluded based on the data evaluation. In the literature search, the search terms "management" and "supervisor" generated a considerable number of studies of disease or patient management and supervising students, respectively. However, these were excluded at the latest in the full-text screening phase because they were out of the administrative scope of this review. In screening for the studies, the research team had constant discussions on differentiating the studies that focused directly on the nursing administrative action of patient education from those that reported administration actions in a limited section of the report.

6. Conclusion

This review provided new insight and a better understanding of nursing administration in patient education. Different nursing administrative actions related to patient education were identified relating to strengthening the commitment to patient education, ensuring that the necessary resources are available, and improving the policies for patient education. These actions highlight the important role of nurse administrators in patient education and should be made more visible. However, further research is needed to assess what are the outcomes of these nursing administrative actions on patient education. The results also revealed various obstacles related to these administrative actions, and these should be explored in the future.

7. Implications for Nursing Management

Based on the results of this review, nurse administrators tend to deprioritize patient education as their administrative action, or they do not have optimal conditions to act upon it. This review can raise awareness among nurse administrators on how to administer one of the central nursing actions and improve its quality. Nursing administrative actions vary, including strengthening the commitment to patient education, ensuring the necessary resources, and enhancing

patient education policies. All these activities should be given high consideration when developing patient education in organizations. The implications for nursing management also include supporting future research in this area: the development of patient education and its management requires more scientific evidence.

Data Availability

The data supporting this integrative review are from previously reported studies and datasets, which have been cited.

Ethical Approval

Good scientific practice was followed throughout the whole review process [39].

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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Research Article

A Delphi Study on the Changes in Work, Organizational Culture, and Health Issues of Nurses at Tertiary Hospitals in South Korea during the COVID-19 Pandemic

MiRa Yun ¹, WonJong Kim ², Boas Yu ³, and Eun-Hi Choi ⁴

¹Department of Nursing, Sangmyung University, 31, Sangmyeongdaegil, Dongnam-gu, Cheonan-si, Republic of Korea

²Department of Nursing, Gimcheon University, Gimcheon-si 39528, Republic of Korea

³Henry P. Becton School of Nursing and Allied Health, Fairleigh Dickinson University, Madison, New Jersey 07940, USA

⁴College of Nursing, Eulji University, Uijeongbu-si 11759, Republic of Korea

Correspondence should be addressed to Eun-Hi Choi; imague0@naver.com

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Nurses in South Korea experience high work intensity and poor working environments, which worsened during the COVID-19 pandemic. This study aimed to evaluate the work changes and grievances of nurses who provided direct care for patients at tertiary hospitals during the pandemic. The nurses' perceptions of their organizational culture and its impact on nurses' health were also explored. A three-round Delphi study was conducted with 36 expert group participants from six South Korean tertiary hospitals. Overall, 36, 35, and 33 participants responded in the first, second, and third rounds, respectively. Nursing work was divided into three categories: "work related to COVID-19-positive and close contacts," "work related to COVID-19 negative patients," and "work related to common nursing tasks." Organizational culture had the highest average for "increased compliance," followed by "increased conflict," "decreased collegiality," and "growing sense of community." The identified health problems of nurses during the pandemic were the highest for physical health, followed by mental and social health. These results showed that the workload and work intensity of hospital nurses increased significantly, and their physical, mental, and social health deteriorated during the pandemic. To overcome the crisis, the nursing organizational culture had a strong inclination to comply with the COVID-19-related guidelines with an increased sense of community. As conflicts between employees and departments grew, these were able to be overcome through trust and communication between departments, in which the nursing leadership played an important role. To protect the health and lives of people, it is important to secure skilled nurses in preparation for future disasters. In addition, support is needed to protect the safety and health of nurses and to cultivate effective nursing leadership.

1. Introduction

The World Health Organization declared the coronavirus disease 2019 (COVID-19) outbreak a global pandemic in March 2020 (WHO, 2020) [1]. The pandemic had significantly impacted politics, economy, society, culture, and healthcare worldwide, with diverse quarantine policies reflecting the community characteristics of each country [2, 3], as the COVID-19 continued in a rapid mass-spread pattern [4]. Nurses were at the forefront of this crisis, facing numerous challenges (i.e., insufficient resources, lack of

personal protective equipment, mandated long working hours, and lack of manpower) [5–7].

South Korea's COVID-19 pandemic management received much attention globally as a relatively successful quarantine effort compared to that of other overseas countries, where the number of confirmed cases and deaths increased rapidly [8, 9]. South Korean health authorities quickly established specialized COVID-19 hospitals and recruited medical personnel to treat patients with COVID-19. However, as the pandemic continued and the specialized hospitals ran out of beds, the role of tertiary hospitals

expanded to include tracking, isolating, and treating the COVID-19 patients [10].

Therefore, during this period, the work of tertiary hospital nurses became challenging by the direct care of patients with COVID-19, and complex and burdensome indirect care tasks (such as monitoring to prevent patients and their caregivers becoming infected, environmental management according to the quarantine guidelines, and adaptation/implementation of frequently changing COVID-19 guidelines), in addition to the general tasks previously performed. In most South Korean medical institutions, nurses experienced various unexpectedly complex and difficult situations in preventing the spread of infectious diseases [11, 12]. South Korean nurses were called “heroes” during the pandemic and recognized as the main players of the “K-quarantine.” However, meaningful and realistic support was lacking regarding the nurses’ grievances and the nurses could not adequately solve their grievances [13, 14].

Before the pandemic, South Korean hospitals were notorious for poor working conditions due to the high job demands and lack of resources for nurses [15]. The COVID-19 pandemic has placed huge physical and psychological burdens on nurses who already have enough on their plates, leading to various health problems. The deterioration of nurses’ working environment has raised concerns about worsening occupational health and safety, physical and mental exhaustion, and other complaints such as physical symptoms (i.e., musculoskeletal strains and pain) during the pandemic [16]. In addition, nurses’ psychological distress was extremely increased as they were dealing with fears of self-infection and concerns about possible viral transmission to their own families, as well as the soaring work demands while witnessing patient suffering and death [17, 18].

While coping with these unprecedented challenging situations in medical institutions, organizational culture also changed rapidly [19]. Organizational culture significantly influences the working environment and therefore substantially affects the behavior and well-being of medical professionals. However, it is difficult in uniformly evaluating the responses of medical institutions and their impact on nurses because the medical organization environments and policies varied worldwide, and the responses to COVID-19 also differed [20]. As nurses struggled to cope with an unprecedented pandemic, changes in their work and organizational culture and in-depth understanding of their health concerns are essential for allocating manpower and resources and for preparing systems for future disasters. However, few studies have focused on the work of nurses in Korean healthcare settings.

Therefore, using the viewpoints of nurses who provided direct care during the pandemic, this study was conducted to identify changes and related grievances in their work role and organizational culture and identify their health issues. We hope to provide some beneficial data for establishing efficient strategies, such as efficient allocation of manpower and resources and system overhaul, to help stakeholders prepare for future disaster situations.

2. Materials and Methods

2.1. Research Design. This survey study derived its results by applying the expert group Delphi technique to understand the COVID-19-related changes in work, organizational culture, and health effects as experienced by nurses who worked at tertiary hospitals in South Korea. The Delphi technique is based on the principle of quantitative objectivity that “opinions of two people are more accurate than that of one person” and the principle of democratic decision-making that “many judgments are more accurate than a few,” when accurate information is lacking on the problem to be estimated [10]. The Delphi technique is a method used to investigate the opinions or judgments of experts in the fields of decision-making, prioritization, and prediction [21].

2.2. Participants. The number of experts can vary from study to study [22], but the majority of Delphi studies have used between 15 and 20 respondents [23]. However, this study aimed to recruit a total of 40 participants, considering the similarities and differences related to the characteristics of the region and hospital size. The participants were nurses from six tertiary hospitals: three in Seoul, the largest city in South Korea, and three in Daejeon City, a medium-sized metropolitan area. The selected hospitals were representative tertiary hospitals in each region, each with more than 20 clinical departments.

The inclusion criteria for participants were head nurses, senior nurses, or general nurses with preferably at least five years of experience or those with a master’s degree or higher, even if their experience was slightly shorter. Nurses working in COVID-19 dedicated wards, intensive care units, operating rooms, outpatient departments, or those in managerial positions not involved in direct patient care were excluded.

Participants were recruited using the snowball sampling technique, and 36 participants agreed to participate after being individually contacted by the researchers. Among the 36 participants, one had less than five years of experience but was included due to holding a master’s degree and serving as a senior nurse in the ward.

The response period for each round was set to two weeks. After sending out the questionnaire, responses were awaited for one week, followed by a reminder message to non-respondents. Another reminder was sent two days before the deadline to encourage responses. Despite these efforts, there were four nonrespondents in the first round, one in the second, and two in the third, resulting in final responses from 36 participants in the first round, 35 in the second, and 33 in the third. All the participants were women with an average age of 35.3 ± 7.9 years. The average nurse experience was 12.7 ± 8.1 years and included staff nurses (44.4%), charge nurses (41.7%), and unit managers (13.9%) in the medical (38.9%) and surgical (61.1%) wards. The levels of education included bachelor’s degrees (38.9%), master’s (or currently attending) degrees (52.8%), and doctorate (or currently attending) degrees (8.3%) (Table 1).

TABLE 1: General characteristics of the expert panel (N = 36).

Variables	Categories	n (%) or M ± SD
Sex	Female	36 (100.0)
Age (years)	<30	11 (30.6)
	30–39	16 (44.4)
	40–49	6 (16.7)
	50≤	3 (8.3)
	M ± SD	35.3 ± 7.9
Experience (years)	<5	1 (2.7)
	5–9	15 (41.7)
	10–19	15 (41.7)
	20≤	5 (13.9)
	M ± SD	12.68 ± 8.1
Position	Staff nurse	16 (44.4)
	Charge nurse	15 (41.7)
	Unit manager	5 (13.9)
Department	Medical ward	14 (38.9)
	Surgical ward	22 (61.1)
Education	Bachelor's degree	14 (38.9)
	Master's degree	19 (52.8)
	Ph.D. degree	3 (8.3)

2.3. Data Collection. The research procedures to identify the COVID-19-related changes in nurses' work, organizational culture, and nurses' health in tertiary hospitals were largely divided into draft development and preliminary survey, first Delphi survey and focus group interviews, structured questionnaire development, and main survey.

2.4. Draft Development. The researchers reviewed various literature and available data on the work and organizational culture of medical hospital personnel using keywords, such as "inpatient ward," "work role," "nurse," "organizational culture," and "COVID-19." The questionnaire was largely composed of three categories: changes in nurses' work, changes in organizational culture, and COVID-19-related effects on health.

Under the category of "changes in nurses' work," the following open question was asked, "What nursing tasks have changed (in the amount or intensity of work) due to COVID-19?" For the category of "changes in organizational culture," the following open question was asked, "What has improved and worsened?" The participants were asked to describe perceived changes in detail. Then, they were asked about their health while coping with the COVID-19 at work.

2.5. Preliminary Investigation. The preliminary survey was conducted on June 25, 2022, to develop questions, and five participants were selected to conduct the survey. The answers were reviewed to determine if the questions seemed ambiguous, if there were any duplicate questions, or if any items seemed inconsistent with the study purpose. Based on the results of the preliminary survey, the researchers revised the questions.

For example, the questions under "changes in nurse's work" were divided into nursing work prior to and during the COVID-19. The questions about "changes in organizational culture" were restructured as the atmosphere within the

organization, communication methods, and efforts to resolve conflicts. Finally, the health questions were reorganized by addressing emotional, physical, and social health aspects.

2.6. Delphi Investigation. The first survey was sent via SNS or text message to 40 consenting participants who provided answers within two weeks. In efforts to better understand the results of the first survey, the researchers conducted a focus group interview with three participants who responded to the first round.

After the focus group, the questions were then refined to form a structured questionnaire.

For example, "changes in nursing work" was largely divided into *work related to COVID-19-negative patients*, *work related to COVID-19-positive patients (and other close contact cases)*, and *work related to common nursing tasks*. As the South Korean government's COVID-19 quarantine policy changed periodically, the time period pertaining to nursing work was limited from 2021 to the time of data collection (the third Delphi survey was completed on September 30, 2022).

To assess changes in organizational culture, the questions were divided into nursing floor (ward) atmosphere, communication, and conflict resolution, and the COVID-19-related health effect was divided into physical health, mental health, and social health.

An objective tool was developed to evaluate the frequency and degree of demand for each configured category on a five-point scale. For example, specific items under "changes in nursing work" were rated on a five-point Likert scale (1 = almost none, 2 = occasional implementation, 3 = normal, 4 = do it often, 5 = do it very often). The frequency of work performance and task difficulty were evaluated (1 = very easy, 2 = easy, 3 = normal, 4 = difficult, and 5 = very difficult). The changes in organizational culture and COVID-19-related health effect were also rated (1 = very disagreeable, 2 = disagreeable, 3 = normal, 4 = agree, and 5 = agree very much).

2.7. Ethical Considerations. This study was conducted after receiving approval from the Bioethics Committee of E University (IRB no. EU22-29). The participants were informed of the study purpose and procedures and provided written informed consent. In addition, the researchers explained that the survey data would be used only for research purposes and that anonymity and confidentiality would be guaranteed. Participants were informed of their right to refuse and withdraw from the study at any time without any consequences. For each Delphi survey conducted, sufficient time was provided to respond to the survey. A small gift was provided to the participants.

2.8. Data Analysis. In principle, the Delphi investigation process is conducted until experts reach an agreement [24] and up to third rounds were performed in this study. The mean and variation coefficients were determined for performance frequency, task difficulty, and degree of consent for each question. The coefficient of variation (CV) is used to evaluate the stability of the question, in which the experts' consensus is high for values <0.5 , while values of $0.5-0.8$ and ≥ 0.8 mean that further Delphi investigations are needed because of low agreement [25]. In this step, investigation after the second step was meaningless if an expert consensus is reached [23]. The present study investigated the opinions of the expert panel of nurses using structured questions until there was a consensus reached. The survey was conducted by delivering the questionnaire online to the experts, who responded within 14 days. Open questions were used in the preliminary survey to indicate specific opinions or items to include in the second and third rounds of the survey. Data were analyzed using IBM SPSS Statistics for Windows, version 26.0.

3. Results

3.1. Frequency and Difficulty of Nursing Work Related to COVID-19. The nursing work related to COVID-19 was largely classified into three categories: *work related to COVID-19-positive patients (and other close contact cases)*, *work related to COVID-19-negative patients*, and *work related to common nursing tasks* (Table 2).

3.2. Work Related to Patients Positive for COVID-19 and Close Contact Patients. The nursing work related to COVID-19-positive patients (and other close contact cases) pertains to performing specific tasks for those patients with confirmed COVID-19 or classified as close contact cases in the ward. In this category, "direct nursing work" rather than "indirect nursing work" increased overall. "Environmental and commodity management," such as cleaning and disinfecting rooms, also increased significantly.

The most frequently performed task related to "direct nursing work" was following the quarantine guidelines including retrieving the COVID-19 results for the patients and guardians ($M = 4.79$, $CV = 0.10$), which was identified as the second highest degree of difficulty ($M = 4.52$, $CV = 0.13$). The most difficult task was wearing protective gear when dealing

with isolated patients or responding to call bells ($M = 4.67$, $CV = 0.12$), indicating that the frequent donning and removing of level D protective gear during each patient encounter was very demanding. The added-on tasks of collecting blood and other specimens directly ($M = 4.00$, $CV = 0.25$; $M = 4.36$, $CV = 0.21$) and serving/assisting with meals ($M = 4.15$, $CV = 0.18$; $M = 4.03$, $CV = 0.22$) had to be performed by nurses themselves.

The most demanding task in indirect nursing was responding to complaints from patients and guardians following their COVID-19 confirmation after hospitalization ($M = 4.61$, $CV = 0.12$). As they were often asymptomatic and became positive while in the hospital, addressing complaints, providing explanation in the event of the confirmation or close contact case designation ($M = 4.55$, $CV = 0.11$), and confirming the change of guidelines for the patients with close contact designation ($M = 4.21$, $CV = 0.19$) were often difficult and time-consuming.

Environmental and product management work also increased significantly and was noted as difficult. The frequency of performance ($M = 4.58$, $CV = 0.12$) and difficulty ($M = 4.52$, $CV = 0.13$) were high for all related procedures, such as securing transport routes for inspection and isolation room. Managing the hospital room was also to be performed frequently and was a demanding task, including transporting confirmed patients and cleaning the hospital room ($M = 4.36$, $CV = 0.18$; $M = 4.42$, $CV = 0.14$), room ventilation, disinfection, linen, and curtain management ($M = 4.48$, $CV = 0.17$; $M = 4.15$, $CV = 0.19$). In addition, product/item procurement and room management for patients and guardians occurred frequently and were time-consuming. This included the direct procurement of drinking water and ice packs/hot packs for quarantined patients ($M = 4.15$, $CV = 0.25$; $M = 4.24$, $CV = 0.17$), room organization and arrangement of personal items as per patients' request ($M = 4.33$, $CV = 0.21$; $M = 4.21$, $CV = 0.18$), and management of resident guardian/couriers and food ($M = 4.33$, $CV = 0.19$; $M = 4.00$, $CV = 0.21$). In addition, the task of medical and general waste management was also performed frequently ($M = 4.52$, $CV = 0.16$) and was physically intensive work ($M = 4.21$, $CV = 0.17$) as some hospitals required nurses to handle medical and general waste due to access restrictions of janitorial staff.

3.3. Work Related to COVID-19-Negative Patients. Work related to COVID-19-negative patients refers to work that was increased or added on due to the pandemic. In this category, "indirect nursing work" increased more than "direct nursing work," and the degree of demand was much higher. Among indirect tasks, the highest degree of demand was an increase in patient status inquiries due to the prohibition of visitors ($M = 4.64$, $CV = 0.12$) and the frequency of this task performance was also high ($M = 4.73$, $CV = 0.10$).

There were increased frequencies of reporting on patients and resident guardians' COVID-19 symptom status ($M = 4.85$, $CV = 0.09$), and the degree of demand was also high ($M = 4.33$, $CV = 0.17$). This increase in reporting was linked to the increasing number of vital sign measurements

TABLE 2: Frequency and difficulty in performing nursing work related to coronavirus disease 2019 (COVID-19).

Category	Item	Frequency		Difficulty	
		Mean	CV	Mean	CV
Direct nursing work	(1) Use protective gear to treat quarantined patients or respond to call bells	4.67	0.12	4.58	0.12
	(2) Multistep nursing activities required according to isolation guidelines until COVID-19 results of patients and guardians are released	4.79	0.10	4.52	0.13
	(3) Direct blood specimen collection by nurses due to access restrictions	4.00	0.25	4.15	0.18
	(4) Serving meals/assisting with meals due to access restrictions	4.36	0.21	4.03	0.22
	(5) Check whether periodic PCR tests are performed and observe symptoms	4.70	0.10	4.33	0.15
Indirect nursing work	(1) Responding to complaints from patients and guardians	4.61	0.11	4.61	0.12
	(2) Explaining the situation in the event of confirmation or close contact	4.27	0.23	4.55	0.11
	(3) Confirmation of changed guidelines during the examination of patients with close contacts	4.36	0.18	4.21	0.19
Work related to COVID-19-positive and close contacts	(1) All procedures, such as securing a transport route for inspection and isolation room	4.58	0.12	4.52	0.13
	(2) Clean the hospital room after quarantine of confirmed patients	4.36	0.18	4.42	0.14
Environmental and commodity management	(3) Direct procurement of drinking water, ice packs, and hot packs for quarantined patients	4.15	0.25	4.24	0.17
	(4) Management of medical and general waste	4.52	0.16	4.21	0.17
	(5) Organize or manage items that are not managed by a single patient	4.33	0.21	4.21	0.18
	(6) Securing beds to move to the hospital room after the quarantine period ends	3.97	0.29	4.15	0.18
	(7) Ventilation, disinfection, linen, and curtain management in the hospital room	4.48	0.17	4.15	0.19
	(8) Assisting guardians (i.e., food and other related management)	4.33	0.19	4.00	0.21

TABLE 2: Continued.

Category	Item	Frequency		Difficulty	
		Mean	CV	Mean	CV
Work related to COVID-19-negative patients	(1) Increased COVID-19 inpatient infections and related discharge education	4.33	0.21	4.27	0.22
	(2) Increased hygiene management such as changing diapers and cleaning up urine/feces	4.15	0.25	4.12	0.31
	(3) Bringing syringes one at a time to each patient to prevent infection	4.27	0.20	4.09	0.19
	(4) Increased number of patients without guardians, increasing meal assistance	3.97	0.31	4.00	0.28
	(5) Increased frequency of checking vital sign measurements for patients/guardians	4.21	0.25	3.97	0.26
Indirect nursing work	(1) Increased calls for patient status due to prohibition of guardian visits	4.73	0.10	4.64	0.12
	(2) Increasing reporting of patients and guardians' COVID-19 symptoms	4.85	0.09	4.33	0.17
	(3) Increased ward tours for patient safety and fall management	4.36	0.15	4.30	0.18
	(4) Increased use of monitors and device rental due to increased patient severity	4.30	0.20	4.06	0.26
	(5) Regular PCR testing and confirmation of results to patients and caregivers, and confirmation of vaccination	4.79	0.11	4.06	0.25
	(6) Increased checklist for COVID-19 testing and infection in surgical patients	4.15	0.31	3.73	0.38
Work related to common nursing tasks	(1) Item delivery to patients due to discontinuation of guardian visits and increased purchases	4.03	0.31	3.91	0.27
	(2) Management of outings (outings of guardians or caregivers, and separation of movement from other outpatients)	4.39	0.21	4.24	0.21
	(3) Explaining the hospital policy (i.e., one guardian per patient, following the guidelines when visiting or going out)	4.70	0.10	4.21	0.15
	(4) Monitoring the application of resident guardians' masks and curtains, and announcing other relevant restrictions	4.91	0.06	4.12	0.19
	(5) Fever check and other related management with visitors	4.76	0.16	4.12	0.25
	(6) Identifying the number of caregivers or guardians	4.58	0.15	3.88	0.30
Environmental and commodity management	(1) Increased calls for patient status due to prohibition of guardian visits	4.73	0.10	4.64	0.12
	(2) Increasing reporting of patients and guardians' COVID-19 symptoms	4.85	0.09	4.33	0.17
	(3) Increased ward tours for patient safety and fall management	4.36	0.15	4.30	0.18
	(4) Increased use of monitors and device rental due to increased patient severity	4.30	0.20	4.06	0.26
	(5) Regular PCR testing and confirmation of results to patients and caregivers, and confirmation of vaccination	4.79	0.11	4.06	0.25
	(6) Increased checklist for COVID-19 testing and infection in surgical patients	4.15	0.31	3.73	0.38
Environmental and commodity management	(1) Item delivery to patients due to discontinuation of guardian visits and increased purchases	4.03	0.31	3.91	0.27
	(2) Management of outings (outings of guardians or caregivers, and separation of movement from other outpatients)	4.39	0.21	4.24	0.21
	(3) Explaining the hospital policy (i.e., one guardian per patient, following the guidelines when visiting or going out)	4.70	0.10	4.21	0.15
	(4) Monitoring the application of resident guardians' masks and curtains, and announcing other relevant restrictions	4.91	0.06	4.12	0.19
	(5) Fever check and other related management with visitors	4.76	0.16	4.12	0.25
	(6) Identifying the number of caregivers or guardians	4.58	0.15	3.88	0.30

for patients and their resident guardians ($M=4.21$, $CV=0.25$; $M=3.97$, $CV=0.26$) because nurses had to monitor not only the patients but also their resident guardians for symptoms and vital sign measurements. In addition, the frequency was high for increasing ward tours for patient safety and fall prevention ($M=4.36$, $CV=0.15$) and the degree of work demand for this task was high ($M=4.30$, $CV=0.18$).

The highest frequencies of direct nursing work were increased COVID-19-related infection and discharge education ($M=4.33$, $CV=0.21$), and the degree of arduousness was high ($M=4.27$, $CV=0.22$). This shows that checking quarantine guidelines, which changed frequently during the chaotic situation of the pandemic; accurately educating patients and guardians; and preventing confusion were the most frequent and arduous tasks.

As the number of patient cases without their resident guardians increased due to the quarantine guidelines, nurses had to perform sanitary management typically performed by the guardians, such as changing diapers and cleaning urine, and both the frequency ($M=4.15$, $CV=0.25$) and the degree of demand ($M=4.12$, $CV=0.31$) were high. In addition, the time per nursing task increased because nurses had to bring only one syringe or a single device at a time for each patient to prevent infection ($M=4.27$, $CV=0.20$), which was too time-consuming and demanding ($M=4.09$, $CV=0.28$).

3.4. Changes in Organizational Culture during the COVID-19 Pandemic

3.4.1. Changes in the Nursing Floor (Ward) Atmosphere. Changes in nursing organizational culture were largely divided into changes in the atmosphere of the ward, communication, and conflict resolution measures (Table 3). First, the change in ward atmosphere was classified into four topics, with the highest average observed for *increased rule compliance* ($M=4.25$), followed by *increased conflict* ($M=4.15$), *reduced collegiality* ($M=3.73$), and *growing sense of community* ($M=3.58$).

The item with the highest average score in *increased rule compliance* was “creating an atmosphere that emphasizes compliance” to the COVID-19 guidelines ($M=4.64$, $CV=0.11$), followed by “eating alone” ($M=4.52$, $CV=0.14$) and “inform/share the frequently changing guidelines and foster interest” ($M=4.33$, $CV=0.17$). To comply with the guidelines, nurses ate alone on their days off (not eating with their families) and during the hospital’s working hours. In addition, they refrained from talking but were encouraged to inform/share any changes in guidelines with colleagues.

Increased conflicts occurred due to differences in opinions between the department, infection control office, and other departments when transporting confirmed patients ($M=4.42$, $CV=0.14$) and experienced “communication breakdown with other employees” due to work overload ($M=4.27$, $CV=0.17$). The next highest scores were observed for *reduced collegiality*, mostly due to the “increase in alternating nursing assignments for the isolation ward to increase manpower” ($M=3.91$, $CV=0.32$), “decreased

personal friendships between employees due to reduced socialization such as ward dinners” ($M=3.76$, $CV=0.26$), and “increased individualism” ($M=3.52$, $CV=0.34$). Some responded that their “sense of community” increased as they came together to overcome the chaotic situations, although the average score was the lowest for this item ($M=3.58$, $CV=0.32$).

3.4.2. Communication and Conflict Resolution Measures. During the COVID-19 pandemic, “non-face-to-face communication through SNS, bulletin boards, videos, and phones” increased ($M=4.12$, $CV=0.19$), while “vertical communication through unit managers” increased ($M=3.70$, $CV=0.25$) and most of the education in hospitals showed “transition to cyber-education, non-face-to-face education, reduced verbal communication” ($M=3.55$, $CV=0.35$).

Regarding conflict resolution measures, the score was highest for: “the attitude of a senior or chief nurse to take the initiative” ($M=3.70$, $CV=0.31$) and “efforts to resolve conflicts between employees through communication” ($M=3.70$, $CV=0.24$). Other conflict resolution measures included: “efforts to understand/sympathize with each other and trust department members” ($M=3.67$, $CV=0.22$), “resolving conflicts through conversations between department heads” ($M=3.45$, $CV=0.28$), “engage in more conversations to find a solution” ($M=3.27$, $CV=0.33$), and “meet with the chief nurse to provide an opportunity to talk about grievances” ($M=3.21$, $CV=0.35$). The lowest score was observed for the item, “avoiding conflict and just moving on” ($M=2.76$, $CV=0.44$).

3.4.3. Health Problems Faced by Nurses during the COVID-19 Pandemic. The most frequently reported health problems faced by nurses during the COVID-19 pandemic were physical health problems ($M=4.55$), followed by mental health ($M=4.33$) and social health ($M=4.19$) problems, with an overall average of 4.35 (Table 4).

The highest physical health score was for “increased fatigue due to frequent shiftwork to cover for infected colleagues” ($M=4.82$, $CV=0.08$). If a previously scheduled nurse was unexpectedly confirmed to be positive for COVID-19, other nurses had to step in to complete the work. The scores for “increased fatigue from increased workload” due to strict quarantine guidelines such as multistep infection prevention measures and wearing protective gear ($M=4.76$, $CV=0.09$) and “feeling sick due to COVID-19 infection” ($M=4.70$, $CV=0.11$) also were high. In addition, even though the self-quarantine period was seven days according to the quarantine guidelines with confirmed COVID-19 infections, “infected nurses could only take five days off and were physically exhausted” ($M=4.48$, $CV=0.19$). The scores for “worsened back pain due to frequent patient turning/position change and increased incontinence care” were also high ($M=4.36$, $CV=0.20$).

The highest mental health score was “increased emotional labor in dealing with guardians and other caregivers” ($M=4.76$, $CV=0.09$), followed by “increased stress due to heavy workloads” ($M=4.64$, $CV=0.14$), “increased anxiety

TABLE 3: Changes in nursing organizational culture during the coronavirus disease 2019 (COVID-19) pandemic.

Categories	Mean \pm SD	Items	Mean	CV
Changes in the atmosphere	4.25 \pm 0.44	(1) Creating an atmosphere that emphasizes compliance	4.64	0.11
		(2) Eating alone (while working and at home)	4.52	0.14
		(3) Inform/share the guidelines and foster interest	4.33	0.17
		(4) Only work-related conversations allowed during work	3.52	0.30
Increased conflict	4.15 \pm 0.22	(1) Increased conflicts between the main department, infection control room, and other departments when transporting confirmed patients	4.42	0.14
		(2) Overwork leads to communication breakdown with other employees	4.27	0.17
		(3) Increased sensitivity/reactivity to each other	4.06	0.19
		(4) Work style conflicts as multiple department personnel are mixed	3.85	0.28
Decreased collegiality	3.73 \pm 0.16	(1) Increase in alternating nursing assignments for the isolation ward to increase manpower	3.91	0.32
		(2) Decreased personal friendships between employees due to reduced socialization, such as ward dinners	3.76	0.26
		(3) Increased individualism	3.52	0.34
Growing sense of community	3.58 \pm 0.00	(1) Increasing sense of community to overcome the crisis together	3.58	0.32
		(1) Non-face-to-face communication through SNS, bulletin boards, videos, phone calls, etc.	4.12	0.19
		(2) Vertical communication through the unit manager	3.70	0.25
Communication and conflict resolution measures	3.64 \pm 0.34	(3) Transition to cyber-education, non-face-to-face education, reduced verbal communication	3.55	0.35
		(4) Communication with caregivers and guardians by broadcast	3.18	0.39
		(1) The attitude of a senior or chief nurse to take the initiative	3.70	0.31
		(2) Efforts to resolve conflicts between employees through communication	3.70	0.24
Conflict resolution measures	3.39 \pm 0.32	(3) Efforts to understand/empathize with each other and trust department members	3.67	0.22
		(4) Resolving conflicts through conversations between department heads	3.45	0.28
		(5) Engage in more conversations to find a solution	3.27	0.33
		(6) Meet with the chief nurse to provide an opportunity to talk about grievances	3.21	0.35
		(7) Avoiding conflict and just moving on	2.76	0.44

due to the risk of transmission to own families" ($M = 4.58$, $CV = 0.12$), and "increased stress due to conflicts with guardians and difficulty communicating with patients" ($M = 4.52$, $CV = 0.14$).

For social health, the item with highest score was "improved societal awareness about nurses during the COVID-19 pandemic" ($M = 4.48$, $CV = 0.17$). Many participants also reported "decreased usual leisure activities due to increased fatigue" ($M = 4.45$, $CV = 0.14$) and that "frequent absenteeism due to fellow nurses' infections/illnesses and extended working hours disrupted family life" ($M = 4.36$, $CV = 0.17$). Many participants also said that they felt "disconnected from social relationships due to social distancing and compliance with quarantine measures" ($M = 4.18$, $CV = 0.22$) and that they were "socially isolated when they were confirmed to have COVID-19" ($M = 4.09$, $CV = 0.24$). Additionally, many responded that it was "painful to prioritize and focus only on hospital work" (i.e., forsaking their normal daily lives/routines during the pandemic) ($M = 3.94$, $CV = 0.28$).

4. Discussion

This study was conducted to determine the changes in work roles and complaints of nurses providing direct patient care for inpatients in South Korean tertiary hospitals during the COVID-19 pandemic and to explore nurses' perceptions of organizational culture and nurses' health problem during the crisis. The study showed that Korean nurses experienced increased work intensity, performed multiple tasks without additional staff, and demonstrated various physical, psychological, and social symptoms while coping with the COVID-19 situation.

Korea's COVID-19 pandemic management utilized a risk-control strategy to manage the possibility of risk at an acceptable level using effective containment measures [10]. Accordingly, all people in contact with confirmed patients were tracked, classified as close contacts, and required to follow the quarantine guidelines. Therefore, whenever patients with confirmed COVID-19 or close contact were unexpectedly identified in multibed inpatient rooms, all required multistep nursing activities had to be carried out according to the quarantine guidelines, which were burdensome and complicated tasks.

Direct nursing tasks that required donning protective gear repeatedly and continued compliance with the strict quarantine guidelines increased physical fatigue and burden, while the number and frequency of indirect nursing tasks such as patient transport management and environmental management (i.e., cleaning/sterilizing room and bed) also increased rapidly [11, 26]. The emotional labor of nurses intensified as they addressed perpetual flurry of complaints from both patients and guardians [26].

Due to the insufficient staffing of nurses, most patients in South Korean medical institutions, except those in few hospitals with special (integrated nursing care service) wards, voluntarily have resident guardians who provide care (usually family members or hired help). These guardians perform some of the nonskilled nursing work, such as

providing incontinence care and washing/dressing the patients [27]. However, during the pandemic, the number of caregivers on duty was limited due to quarantine requirements. Therefore, nurses had to perform more frequent ward rounds to monitor patient conditions, procure supplies for patients and caregivers, and manage the ward.

Tasks such as changing diapers and assisting with meals (which were typically performed by guardians) became additional tasks for nurses, as the allowed number of guardians was limited due to the COVID-19 guidelines. Other added-on indirect nursing work such as purchasing and delivering of goods (water, snacks, etc.) for quarantined patients also increased. Nurses also had added-on work of other personnel, such as phlebotomist, dietary, and janitorial staff [28]. As most hospitals restricted access to other nonnursing personnel to prevent the spread of infection, nurses had to perform nonnursing work, such as collecting blood and other laboratory specimens, delivering/serving meals, and disinfecting/sterilizing supplies.

In addition, when moving patients with COVID-19, the movement of others in hallways, elevators, and other areas had to be controlled. Therefore, they had to follow strict quarantine procedures, including notifying other patients and caregivers, and contacting facility management. Nurses were also required to provide numerous explanations and make announcements. These include explaining the policies, such as having only one resident guardian per patient; checking and explaining the COVID-19 guidelines when going out/leaving the hospital or visiting; monitoring the proper application of guardians' masks and hospital room curtains, management of guardians' outings, and separation from visitors as needed; and knowing/enforcing infection control guidelines and hospital regulations.

This study illustrates the reality of Korean hospitals, where nurses are expected to perform a myriad of patient-related tasks, including the role of doctors, phlebotomist, nursing assistants, and clinical pathologists, as well as the role of room management, transport, and cleaning services, without any specific job role limitations. Nurses in South Korean hospitals have expressed distress regarding the inability to eat, use the bathroom, and engage in whatever task they have to perform [15]. Distress among nurses gained attention during the COVID-19 pandemic.

This is also a problem with the current legal system, where the role of nurses is not clearly defined in the law but only mentioned in a single line in the Medical Service Act revised in 1973, "nursing or medical attendance of the sick or pregnant women" [29]. Although in Korea, the role of nurses over the past 5 years has become more sophisticated and broader in scope with the rapid development of medical technology, the law has not been updated, creating a myriad of problems [30]. The definition of the role of nursing is unclear; therefore, the advanced tasks performed by nurses cannot be verified whether they are legal, but all the tasks in hospitals can easily be transferred to nurses.

In addition, the ratio of patients to nurses in Korean hospitals is high by default. A study reported that the patient per nurse ratio (16.3 patients per nurse) was very high and was 2-3 times higher than that of either the United States or

TABLE 4: Health problems faced by nurses during the coronavirus disease 2019 (COVID-19) pandemic.

Categories	Mean \pm SD	Items	Mean	CV
Physical	4.55 \pm 0.21	(1) Increased fatigue due to frequent shiftwork to cover for infected colleagues	4.82	0.08
		(2) Increased fatigue from increased workload due to strict quarantine guidelines (multistep protective measures, wearing protective gear, etc.)	4.76	0.09
		(3) Feeling sick due to COVID-19 infection	4.70	0.11
		(4) When infected, nurses could only take five days off and were physically exhausted	4.48	0.19
		(5) Increased musculoskeletal and other physical symptoms due to increased intensity of work and frequently wearing uncomfortable protective gear	4.42	0.16
		(6) Worsened back pain due to frequent patient turning/position change and increased incontinence care	4.36	0.20
		(7) Muscle weakness and decreased physical strength	4.27	0.21
Psychological	4.33 \pm 0.39	(1) Increased emotional labor in dealing with guardians and other caregivers	4.76	0.09
		(2) Increased stress due to heavy workloads	4.64	0.14
		(3) Increased anxiety due to the risk of transmission to own families	4.58	0.12
		(4) Increased stress due to conflicts with guardians and difficulty communicating with patients	4.52	0.14
		(5) Difficulty in coping with stress	4.39	0.16
		(6) Increased stress due to insufficient care time per patient due to heavy workloads	4.18	0.20
		(7) Increased loneliness and depression	3.97	0.20
		(8) Low self-esteem ("I studied for 4 years and got a diaper license.")	3.61	0.30
Social	4.19 \pm 0.27	(1) Improved societal awareness about nurses during the COVID-19 pandemic	4.48	0.17
		(2) Decreased usual leisure activities due to increased fatigue	4.45	0.14
		(3) Frequent absenteeism and extended working hours interfered with family life	4.36	0.17
		(4) Disconnected from social relationships to keep social distance and to comply with quarantine measures	4.18	0.22
		(5) Socially isolated when they were confirmed to have COVID-19	4.09	0.24
		(6) Painful to prioritize and focus only on hospital work	3.94	0.28
		(7) Nurses caring for COVID-19 patients were avoided by others	3.79	0.26

the United Kingdom [31]. Even before COVID-19, it was reported that 63.2% of nurses in South Korean hospitals skipped meals more than once a week due to workload, 48.2% did not have annual leave/vacation, and 81.0% were at high risk for accidental injuries due to insufficient staffing [32]. The COVID-19 pandemic has exacerbated the poor working conditions of these nurses.

Another challenge for nurses was the inability to take time off for holidays or weekends due to the frequent shift changes. For example, it was common for an off-duty nurse to cover for a colleague who could not report to work due to an unexpected COVID-19 case. Despite the quarantine guidelines of self-quarantining for 7 days in the event of COVID-19, nurses often had only five days off before returning to work. The reason was that the hospital was not staffing enough nurses and was running shifts with fewer staff, so no nurses were available to cover the vacant duties. Nurses became exhausted and often experienced symptoms, such as physical pain, fatigue, depression, anxiety, and posttraumatic stress disorder because of long hours of high-intensity labor, lack of rest, and limited manpower [33–35]. If no nurses were available to replace them, the workload increased due to overwork. If a nurse suddenly resigned midshift, the remaining nurses suffered with a heavier workload [11, 17].

These poor working conditions during the pandemic contributed to nurses' health problems, which were not only physical and psychological symptoms due to the stress and

strain at work, but also social, such as limited contact with family and friends to protect patients. With less time and opportunities for stress relief and self-care, prolonged negative emotional and psychological states can affect nurses' mental health and quality of nursing [36]. Therefore, systematic coping support for nurses to meet their physical and mental needs is important [37], as well as providing reasonable job accommodations (i.e., flexible shiftwork schedules, appropriate time-off for proper rest and self-care) [7, 38]. However, such support systems are rare in Korea.

As a result of this poor working environment, the resignation rate of Korean nurses is increasing yearly. In 2018, 42.7% of new nurses working in tertiary or general hospitals resigned within a year of hire; this number surged to 52.8% in 2021 (during the COVID-19 outbreak) [39]. Currently, the average year worked for hospital nurses in South Korea is only seven years and eight months, with 52.1% having less than five years of experience [40]. A sufficient number of well-skilled and experienced nurses are important to provide high-quality nursing, especially in the case of future disasters. However, during the COVID-19 response, a major issue in South Korea's disaster response system was identified as the availability of human resources [41].

To address the shortage of nurses, the Korean government has promoted a policy of continuously increasing the number of admissions to nursing schools. Therefore, the number of nursing admissions in Korea has increased to the highest among Organization for Economic Cooperation and

Development (OECD) countries, although the number of nurses actually working in clinical practice is lower than the OECD average [42, 43]. In other words, most graduate nurses cannot bear the poor reality with the nature of the work and eventually leave the field. To ameliorate this problem, the Nursing Workforce Human Rights Act, which stipulates the number of patients per nurse, was proposed by civil society organizations [44], and the Nursing Act, which stipulates the role and scope of nurses, passed the National Assembly with difficulty, but was not funded and abandoned due to the medical associations, various interest groups, and political reasons [45]. The COVID-19 pandemic has shown that policy and institutional changes to maintain a stable workforce of qualified nurses are very urgent and can no longer be postponed.

Meanwhile, the biggest change in the organizational culture of nurses was “compliance with COVID-19 guidelines,” which has emerged as top priority. Such strict compliance was an effort by nurses to control dangerous situations as much as possible. Previous studies showed that nurses implemented infection control measures more strictly than others to prevent the spread of infection and to limit contact not only between medical personnel in hospitals but also with own family members [11].

In addition, conflicts between employees and departments increased amid confusion, with a breakdown in communication. Face-to-face meetings disappeared and collegiality between employees decreased as they mainly communicated non-face-to-face. However, the leadership of nurses in charge or the unit managers was mentioned as the driving force in resolving conflicts, and difficult situations were overcome through dialogue and trust between departments [11, 17].

Studies demonstrate that effective nursing leadership is critical for disaster response. In a study of nursing leadership in South Korea during the COVID-19 pandemic, Oh et al. found that nursing leaders played an important role in providing clear communication, facilitating team collaboration, and allowing nurses to access appropriate protective gear and resources [46]. The authors argued that nursing leaders should possess the skills necessary to effectively manage and support clinical teams.

In summary, hospital nurses in South Korea experienced physical, psychological, and social health problems during the pandemic as they endured increased work intensity, insufficient leave, inadequate support and resources, and a lack of legislation on their role. However, through their dedication, leadership, and commitment to following guidelines, nurses have overcome the challenges.

The unprecedented COVID-19 pandemic was very challenging and difficult for medical personnel worldwide. During the pandemic, nurses worldwide faced numerous challenges, such as fear of contagion, burnout from excessive work, physical fatigue, moral pain, and high level of stress [7, 47–49]. However, in past disasters, altruistic nurses overcame crises with a sense of vocation [50, 51]. Nurses strengthened their sense of solidarity and formed cooperative relationships in dealing with the COVID-19 [8, 9, 40]. The positive organizational culture and

atmosphere played a pivotal role in overcoming adversities or difficult challenging situations by enhancing individual nurses’ responsibilities for human-centered care [11, 13, 52].

Based on the study findings, we suggest the following.

First, healthcare laws and regulations should be revised and overhauled by effectively reducing patient-nurse ratios and legally clarifying nurses’ professional roles to reduce excessive workloads and burdens on nurses.

Second, approaches should be explored to improve the organizational culture of nursing and the leadership of nurse managers.

Third, a national support system for nurses’ mental and physical health is needed.

4.1. Strengths and Limitations. This study collected data from 36 nursing experts from six tertiary hospitals nationwide in South Korea. Owing to the limitations in sampling, these results cannot be generalized. Another limitation is that the data were derived from the perspective of nurses and do not reflect the views of the whole hospital, including other professions. Nevertheless, using the Delphi technique, we obtained a consensus from the recruited experts regarding the changes in work, organizational culture, and health problems faced by nurses working in top tertiary hospitals during the pandemic. It is also meaningful in that it provides a picture of the realities faced by nurses based on their first-hand account of the work crisis.

4.2. Implications for Nursing Management. This study has shown that, despite the many challenges Korean nurses faced, their sacrifices were vital to the nation’s efforts to overcome the pandemic. It has also highlighted the problems caused by the lack of adequate staffing and a clear legislation on the role of nurses. In conclusion, this study suggests that policies to address the legal and institutional deficiencies related to the nursing workforce are urgently needed to prepare for future disasters and protect public health and lives.

In the future, nursing educators and clinical professionals should actively discuss and conduct research on the appropriate deployment of nursing staff, defining the scope of nurses’ roles and duties and improving the working environment for nurses. Concurrently, they should continue to demand legal and institutional improvements from hospital administrators and the state. Research should also focus continually on developing nurses’ leadership skills.

5. Conclusions

The results of this study showed that the workload and work intensity of South Korean hospital nurses increased significantly, and their physical, mental, and social health deteriorated during the COVID-19 pandemic. The reason for this was the unprecedented crises and related confusion caused by the pandemic itself, as well as the characteristics of South Korean medical institutions. Due to the high patient to nurse ratio, the intensity of nurses’ work is too high. This is further compounded by the fact that role of nurses is not

legally defined, which placed nurses in disadvantaged position and became worse during the pandemic. However, to overcome the crises, the nursing organizational culture had a strongly supportive atmosphere of the guideline compliance with an increased sense of community. Even though conflicts between employees and departments grew as the pandemic persisted, these were resolved based on trust and communication between departments, with effective nursing leadership playing an important role.

Data Availability

Data used to support the findings of this study are available upon request by e-mail to the corresponding author.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this study.

Authors' Contributions

All authors have participated in the conception and design of the study. MRY and WJK contributed to the data collection and analysis. MRY, WJK, and EHC prepared the first draft of the manuscript and critically revised the article. EHC and BY were involved in critically revising the manuscript. All authors read and approved the final manuscript. MRY and WJK are the co-first authors and contributed equally to this work.

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Research Article

Design and Validation of an Instrument for the Evaluation of the Quality of Mother-Child Bond and Attachment: “Cuestionario Vínculo y Apego Materno-Filial” (VAMF Questionnaire)

Maria Antonia Diaz-Ogallar ^{1,2}, Antonio Hernandez-Martinez ³,
Manuel Linares-Abad ² and Juan Miguel Martinez-Galiano ^{2,4}

¹Unit of Clinical Management Jodar, Andalusian Health Service, 23500 Jodar, Spain

²Nursing Department, University of Jaen, 23071 Jaen, Spain

³Department of Nursing, Physiotherapy and Occupational Therapy, Ciudad Real Faculty of Nursing, University of Castilla-La Mancha, 13071 Ciudad Real, Spain

⁴Consortium for Biomedical Research in Epidemiology and Public Health (CIBERESP), 28029 Madrid, Spain

Correspondence should be addressed to Juan Miguel Martinez-Galiano; jgaliano@ujaen.es

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The relationship between a mother and her newborn can be determined through two concepts: “bond” and “attachment.” Currently, there are no instruments that assess these phenomena jointly. *Objective.* This study aims to develop a valid and reliable instrument to determine the quality of the postnatal bond and attachment in the mother-child relationship. *Methods.* In Spain, a multidisciplinary panel of experts was involved in creating the “Maternal-Child Bond and Attachment (VAMF, for its initials in Spanish)” tool. The tool was piloted on a group of women and applied to the target population of women with children aged between 6 weeks and 18 months to determine the psychometric characteristics: internal consistency Cronbach’s α was used. An exploratory factor analysis was conducted, a study of convergent validity with the scale and predictive validity with the Maternal Postnatal Attachment Scale (MPAS) using Pearson’s correlation coefficient, and a study of reliability was carried out using the intraclass correlation coefficient. *Results.* 1155 women participated, with a mean age of 34.5 years. The VAMF showed good internal consistency for the scale with 29 items ($\alpha = 0.836$). In the exploratory factor analysis (EFA), an explained variance of 49.71% was observed with 6 components. Convergent validity showed an adequate correlation, with a Pearson correlation coefficient with the MPAS scale of 0.679. The VAMF questionnaire presented an excellent predictive capacity in the bond subscale, with an area under the ROC curve of 0.90 (95% CI: 0.87–0.93), and a poor predictive capacity in the attachment subscale, with an area under the ROC curve of 0.69 (95% CI: 0.63–0.76) to predict MPAS scale scores. In the test-retest, the VAMF presented a very good adequate degree of absolute agreement (ICC: 0.86; 95% CI: 0.72–0.93). *Conclusions.* The VAMF is a new valid and reliable instrument for determining the quality of the mother-child bond and attachment.

1. Introduction

The development of the mother-newborn relationship is crucial, as the way in which this relationship is established will determine its future evolution, and creates the precedent on which the rest of the newborn relationships will be established throughout life [1, 2].

Different factors influence the formation of a mother-child relationship and can affect bonding and attachment, key aspects within this relationship, and can cause issues in both the mother and the newborn. Maternal mental health influences the formation of the maternal-child bond, and the presence of depressive symptoms, anxiety, or posttraumatic stress symptoms are related to difficulties in establishing this

bond and adapting to the maternal role, difficulties in the response of the mother toward the needs of the newborn, and issues in the level and quality of subsequent attachment [3–8]. Likewise, the health status of the newborn, prematurity, and the presence of comorbidities are factors that affect the bonding process and the establishment of attachment [8]. High levels of stress hinder the development of a bond, change the quality of the interaction between the mother and child, and affect the mother's behavior, which may, in turn, affect the child's behavior and executive function, which is responsible for monitoring and regulating cognitive processes during the performance of complex cognitive tasks [8–10]. Adequate quality in mother-child interaction facilitates the child's socioemotional, behavioral, and cognitive development and could even be related to the child's physical health [11]. Alhusen et al. [12] highlighted the importance of the mother-child bond as a health concept, considering it a predictor of neonatal health and well-being.

Most women establish an adequate relationship with their children, although a significant number of mothers present difficulties in establishing this relationship [1]. In the United States, it is estimated that approximately 65–70% of children have a secure attachment style, while the remaining 30% have an insecure attachment style [13].

Two fundamental concepts are related to the relationship between mother and child: "bond" and "attachment." These two concepts are closely related and are even used as synonyms to refer to the mother-child relationship, but both cover different aspects and moments of the said relationship [14–17].

The term "attachment" is a broad and complex concept within the mother-child relationship. Attachment can be considered as the affective bond that an individual, the newborn, establishes with a specific figure, in this case, the mother, and is a discriminatory, specific, and lasting behavior [18]. Attachment refers to reciprocity and interaction between the mother and child [15]. It can be understood as an affective bond of social origin, not innate, based on cognitive, emotional, and behavioral components and remains relatively stable throughout life. It manifests itself in the form of efforts by the newborn to seek and maintain proximity to the mother, behaviors encompassed within the "attachment behavior" [19, 20]. Hence, establishing attachment relationships with others is fundamental for human survival [21].

Three types of attachments have been established. Children with a secure attachment style use their mothers as a secure base for exploration, intensifying attachment behavior in episodes of separation. When reuniting with the mother, the child seeks contact and proximity. Children with an insecure-avoidant attachment style are quite independent and engage in exploratory behavior regardless of the mother's presence. When they are separated from their mother, they barely cry; when reunited, they mix proximity-seeking and avoidance behaviors. Finally, children with an insecure-ambivalent attachment style show signs of anxiety and distress during separation. When the mother returns, they seek close contact mixed with anger and resistance [13, 21–23].

A bond is understood as the emotional connection or union that a mother experiences toward her child [15, 16, 24]. It could be defined as a maternal affective state, with the mother's feelings and emotions toward her child as indicators of the bond established between the two [24]. This bond begins to form during pregnancy, and even before it, and continues to develop after birth [17, 25].

The bond is unidirectional, from the mother to the fetus, referring to the mother's emotional response to her child. In contrast, attachment is bidirectional, between the mother and the newborn, specifically referring to the reaction of the newborn, in the form of organized and stable behavior directed toward the main caregiver, the mother, in order to ensure the protection and safety of the newborn [15–17, 26–28]. The bond develops in the early phase of the maternity process and is related to the care provided by the mother to the newborn; while attachment is a later process, which generally occurs after childbirth, and is focused on the search for care by the newborn [14, 16, 26, 27].

The use of both concepts to refer to the mother-child relationship is complex, which is why some authors choose to use the term "mother-child relationship," which combines both "bond" and "attachment" [15, 16, 29].

There are instruments designed to measure bond and instruments that measure attachment, with the following standing out: Maternal-Fetal Attachment Scale (MFAS) [15, 30], Prenatal Attachment Inventory (PAI) [15, 31], Maternal Antenatal Attachment Scale (MAAS) [15, 32], Pre- and Postnatal Bonding Scale (PPBS) [15, 33], Maternal Postnatal Attachment Scale (MPAS) [15, 34], Postpartum Bonding Questionnaire (PBQ) [15, 35–37], and y Maternal-to-Infant Bonding Scale (MIBS) [15, 38].

In addition, there are other measurement instruments focused on mother-child interaction in specific situations, particularly evaluating the child's reaction through a series of objective parameters, in order to determine the type of attachment. Among these instruments are the aforementioned "stranger situation" and the Massie-Campbell scale [39].

Different measurement instruments assess the quality of the bond, pre- and/or postnatal, and the attachment between mothers and children. These instruments focus on determining either the bond or attachment, closely related phenomena that are the cornerstone of the mother-child relationship. However, no single instrument has been identified that allows the assessment of both parameters, either to assess the joint impact of both parameters or independently, depending on the interest at each moment with the advantages that this entails. There is a need for an instrument that can determine the quality of bonding and attachment using a single questionnaire, in order to early detect suboptimal bonding and/or attachment in newborns aged between 6 weeks and 18 months. This instrument could be used in a quick, easy, and practical way in clinical-care settings to intervene and prevent early dysfunctions that may have negative consequences for the mother-child dyad.

Therefore, we aimed to develop a valid and reliable instrument to determine the quality of the postnatal bond and attachment in the mother-child relationship.

2. Methods

2.1. Phase 1: Design and Questionnaire Development. A bibliographic search was carried out in the main health sciences databases (Scopus, Web of Science (WoS), ProQuest, CINAHL, and PubMed) from November 2021 to February 2022.

After reviewing in detail 40 existing instruments for measuring the bond, attachment, and different aspects of the mother-child relationship, and after consulting with professionals in pediatrics, neonatology, midwifery, nursing, psychology, psychiatry, and anthropology, a questionnaire was developed comprising of 31 items divided into two subscales: a bond subscale made up of 18 items and an attachment subscale made up of 13 items. This led to version 0 of the questionnaire “Mother-Child Bond and Attachment” (VAMF, for its initials in Spanish).

2.2. Phase 2: Expert Panel. After obtaining version 0 of the VAMF questionnaire, it was evaluated by a multidisciplinary panel of experts. Twelve experts from different disciplines were contacted: nursing, pediatrics, midwifery, pediatric nursing, psychiatry, neonatology, psychology, and anthropology, for its evaluation. It was also taken into account that the experts came from different regions of Spain to consider the cultural and linguistic variety that could exist when interpreting the questions and answers of the questionnaire. They were contacted via e-mail, inviting them to participate in this research as experts in mother-child relationships by evaluating the questionnaire prepared. Once they agreed to participate, they were sent the original questionnaire, and they were asked to evaluate it, assigning a score of 1 (best score) to 5 (worst score) to each of the items that make up the questionnaire based on four parameters: writing, understanding, relevance and general assessment. Likewise, a section was included for them to provide any observations they considered appropriate on each item. Regarding the evaluation of the questionnaire in general, an observation section was set up for its evaluation in general terms and for them to make the contributions/suggestions they considered appropriate.

Once the 12 evaluations were received, the feedback was collated, and the appropriate corrections were made based on the experts’ opinions, obtaining version 1 of the questionnaire. The modified questionnaire was sent back to the panel of experts for a second evaluation, after which their approval was received.

2.3. Phase 3: Pilot of Questionnaire. Women with children between the ages of 6 weeks and 18 months were actively recruited in the Nursing (through the Healthy Child Program and the Vaccination Program), Midwife, and Pediatrics offices of the Dr. Ricardo Fernández Valadés Health Center (Jódar, Jaén) between the months of May and August 2022. A sample of 15 mothers was obtained who were given appointments to come in and complete the VAMF questionnaire together with the MPAS questionnaire. Once the questionnaire was completed, an interview was conducted

with each mother so that they could evaluate the VAMF and make the contributions they considered appropriate: they assessed whether the statement of each item was correct, understandable, and had an adequate length; the adequacy of the items; the categorization of the answers; the general opinion of the mother about the items; length; and format of the questionnaire and if they found any difficulty when completing it. In addition, they were asked to evaluate the questionnaire in general and to make any contributions or suggestions they considered appropriate.

After this pilot, one of the items was modified, obtaining version 2 of the questionnaire.

2.4. Phase 4: Application of the Instrument to the Target Population to Determine Its Psychometric Properties

2.4.1. Design and Subject Selection. For this part, a cross-sectional validation study was carried out with women who had a child in Spain. This phase of the study was carried out from September 2022 to March 2023 in Spain. The inclusion criteria were women aged between 18 and 45 years, with a biological child whose age is between 6 weeks and 18 months, who have previously signed the informed consent for participation in the study. The exclusion criteria were mothers of multiple births (two or more newborns) and those who do not speak or do not know the Spanish language (language barrier).

To recruit women for our study sample, different associations that were related to pregnancy, childbirth, and postpartum and support groups for breastfeeding and parenting throughout the Spanish territory were contacted. Following the application of inclusion and exclusion criteria, participants were informed about the objective and mode of participation in the study. Once they consented to participate, they were provided with the questionnaire online.

The sample size was estimated according to the criteria for carrying out a factorial analysis. These criteria consider 10 subjects for each item [40]. Therefore, we needed a sample of at least 310 participants.

2.4.2. Information Sources. To collect the necessary information for validation, a questionnaire was developed consisting of sociodemographic and clinical variables of both the mother and the newborn, which included the validated tool “MPAS” [34, 41], and the new tool to be validated, “VAMF” version 2. For its distribution, contact was made with different associations related to pregnancy, childbirth, and the postpartum period, and with support groups for breastfeeding and parenting throughout the Spanish territory. After applying the inclusion and exclusion criteria, the participating women were informed and accepted the informed consent for participation in the research, and the questionnaire was administered to them.

2.4.3. Measuring Instruments. The postnatal attachment was evaluated using the “Maternal Postnatal Attachment Scale” (MPAS) questionnaire. This questionnaire was developed by

Condon and Corkindale in 1998 and assesses the mother's emotional response to her newborn. It is made up of 19 items that describe the mother's feelings toward her baby/child. Each item is scored using a Likert-type scale ranging from 1 (worst score) to 5 (highest score), except for items with inverse scores. The lower the score, the less the bond between the mother and the child. The MPAS presents good psychometric capabilities, with adequate internal consistency ($\alpha = 0.78$) [34, 38, 41].

2.5. Statistical Analysis. For sociodemographic and clinical data, absolute and relative frequencies were used to describe the qualitative variables, and the mean and standard deviation (SD) were used to describe the quantitative variables.

First, the reliability analysis was performed using Cronbach's α to assess internal consistency (IC). The IC tells us to what extent the items in question are correlated with each other and how they fit together and measure the same concept. Cronbach's α is one of the most widely used measures to assess the reliability of a scale. Its values range from 0 to 1. One of the most accepted rules is to consider $\alpha > 0.9$ as excellent, $\alpha > 0.8$ as good, $\alpha > 0.7$ as acceptable, $\alpha > 0.6$ as questionable, $\alpha > 0.5$ as poor, and $\alpha < 0.5$ as unacceptable [42].

To determine the scale's validity, we analyzed three of the most common types: construct validity, convergent validity, and criterion validity.

Regarding construct validity, we carried out an exploratory factor analysis (EFA) to determine the underlying factors through the principal component analysis (PCA). Before performing the EFA, we analyzed the Kaiser–Meyer–Olkin (KMO) tests and Bartlett's tests of sphericity, which indicate whether this analysis was appropriate to apply. For this to be the case, the KMO must be above 0.6 and as close as possible to 1, and the Bartlett sphericity, which consists of the statistical hypothesis test, must be less than 0.05 to reject the null hypothesis of sphericity and ensure that the factorial model is adequate to explain the data. In the EFA, we use varimax rotation to help clarify the allocation of items to different factors. To determine the number of factors to maintain, we used the Kaiser criterion, which is one of the most widely used criteria; factors with eigenvalues greater than unit value are retained [43].

Next, the convergent validity was studied. For this, we studied the relationship between the VAMF and the MPAS using the Pearson correlation coefficient, as well as the predictive capacity of the VAMF scale and its two attachment and bond subscales with the MPAS scale. In addition, the predictive capacity of the VAMF scale over the MPAS scale was estimated. To do so, the MPAS variable was dichotomized for a score below the 10th percentile (low bond). The area under the ROC curve (AUC) was estimated with their respective 95% confidence intervals, as well as the Youden index to determine the best cut-off point.

The next step was to determine the criterion validity. In this analysis, the scores obtained in the test were compared with some factors that could be an obstacle to the establishment of the bond and secure attachment, such as the type of birth, admission of the newborn, type of breastfeeding,

hospital stay, and skin-to-skin contact. Thus, a bivariate analysis was carried out using the Pearson or Student–Fisher chi-square tests, depending on the qualitative or quantitative nature of the variables. The results were considered statistically significant when $p \leq 0.05$.

Lastly, intraobserver reliability was evaluated using a test-retest test in a sample of 30 women who took the questionnaire again 24 hours after completing the first one, using the intraclass correlation coefficient in this case.

Version 24.0 of the statistical package SPSS was used.

2.6. Ethical Considerations. The Research Ethics Committee of the Province of Jaen approved this study (DCVA-21/2012-N-21). First, mothers had to read the information sheet about the study and its objectives and then they accepted the informed consent for participation in the study. Once the informed consent was accepted, they completed the questionnaire.

All methods were carried out in accordance with relevant guidelines and regulations. Informed consent was obtained from all participants.

3. Results

3.1. Participant Characteristics. 1155 women participated (66 declined to participate) with a mean age of 34.5 years (SD = 3.90), and 58.4% (675) were married. 88% (1016) did not have any disease. For 56.5% (653) of the women, this was their first pregnancy. 41.9% (484) reported having had health problems related to pregnancy. 58.6% (667) of the women had a normal vaginal birth, and 80% (924) used analgesia during it. 78.4% (905) started breastfeeding early after birth, and 83.7% (967) had skin-to-skin contact after birth. Regarding the babies, the mean age was 8.6 (SD = 5.56) months, 4.6% (53) were premature, and 83.5% (965) were still breastfeeding. The data can be consulted in Table 1.

3.2. Psychometric Properties

3.2.1. Internal Consistency. To assess the internal consistency, Cronbach's α was used for the entire questionnaire. During the first evaluation of all the items, it was observed that removing items 5 and 6 improved the scale's total score. Thus, for the scale without these two items, the α was 0.836. With this modification, all alpha values scored above 0.823 when removing an item. The α values for each factor are shown in Table 2. After removing these items, we proceeded with a new enumeration of the questions, modifying the scale to 29 items (version 3 of the questionnaire). All corrected item-total correlations were above 0.

3.2.2. Intraobserver Reliability (Intraobserver Stability). Finally, the test-retest test was carried out by administering the VAMF questionnaire to a group of 30 mothers who completed it twice, separated by a period of 24 hours. The analysis showed excellent agreement, with an intraclass correlation coefficient of absolute agreement of 0.86 (95% CI: 0.72–0.93) and a consistency intraclass correlation coefficient of 0.85 (95% CI: 0.71–0.93).

TABLE 1: Descriptive characteristics of the study participants.

Variable	N = 1155 N (%)
Maternal age mean (SD)	34.5 (3.90)
<i>Civil status</i>	
Married	675 (58.4)
Common-law couple	184 (15.9)
Single	284 (24.6)
Divorced	9 (0.8)
Separated	2 (0.2)
Widowed	1 (0.1)
<i>Nationality</i>	
Spanish	1127 (97.6)
Not Spanish	28 (2.4)
<i>Approximate income level</i>	
<1000 euros/month	221 (19.1)
Between 1000 and 1999 euros/month	618 (53.5)
Between 2000 and 2999 euros/month	255 (22.1)
>3000 euros/month	61 (5.3)
<i>Current illness</i>	
No	1016 (88.0)
Yes	139 (12.0)
<i>Number of pregnancies</i>	
1	653 (56.6)
2	326 (28.2)
≥3	174 (15.2)
<i>Number of miscarriages</i>	
0	799 (69.2)
1	263 (22.8)
2	66 (5.7)
≥3	27 (2.3)
<i>Number of vaginal births</i>	
None	240 (20.8)
One	687 (59.5)
Two	201 (17.4)
Three or more	27 (2.3)
<i>Number of cesareans</i>	
None	850 (73.6)
One	272 (23.5)
Two	29 (2.5)
Three or more	4 (0.4)
<i>Number of children</i>	
None	3 (0.3)
One	844 (73.1)
Two	271 (23.5)
Three or more	37 (3.1)
<i>High-risk pregnancy</i>	
No	954 (82.6)
Yes	186 (16.1)
NA	15 (1.3)
<i>Planned pregnancy</i>	
No	109 (9.4)
Yes	1046 (90.6)
<i>Reproductive technique</i>	
No	991 (85.8)
Yes	164 (14.2)
<i>Attended antenatal classes</i>	
No	351 (30.4)
Yes	804 (69.6)

TABLE 1: Continued.

Variable	N = 1155 N (%)
<i>Type of birth</i>	
Normal	677 (58.6)
Instrumental	219 (19.0)
Scheduled cesarean	68 (5.9)
Emergency cesarean	191 (16.5)
<i>Analgesia/anesthesia</i>	
No	231 (20.0)
Yes	924 (80.0)
<i>Weeks at birth</i>	
Term (≥37 weeks)	1096 (94.9)
Moderate preterm (32–37 weeks)	50 (4.3)
Very preterm (28–32 weeks)	7 (0.6)
Extreme preterm (<28 weeks)	2 (0.2)
<i>Problems during pregnancy</i>	
No	671 (58.1)
Yes	484 (41.9)
<i>Early initiation of breastfeeding</i>	
No	235 (20.3)
Yes	905 (78.4)
NA	15 (1.3)
<i>Skin-to-skin contact</i>	
No	185 (16.0)
Yes	967 (83.7)
NA	3 (0.3)
<i>Complications after birth</i>	
No	963 (83.4)
Yes	192 (16.6)
<i>Length of hospital stay</i>	
1 day	144 (12.5)
Two days	605 (52.4)
Three days	273 (23.6)
Between 3 days and one week	123 (10.6)
More than one week	10 (0.9)
<i>ICU admission</i>	
No	1138 (98.5)
Yes	17 (1.5)
<i>Hospital readmission</i>	
No	1129 (97.7)
Yes	26 (2.3)
<i>Mental health illness</i>	
No	872 (75.5)
Yes	283 (24.5)
<i>Smoker</i>	
No	1046 (90.6)
Yes	109 (9.4)
<i>Frequency of alcohol consumption</i>	
None	379 (32.8)
Occasional	694 (60.1)
Habitual	82 (7.1)
<i>Age of newborn (SD)</i>	8.6 (5.56)
<i>Sex of newborn</i>	
Female	620 (54.1)
Male	527 (45.9)
<i>Maintenance of breastfeeding</i>	
No	190 (16.5)
Yes	965 (83.5)

NA, not available.

TABLE 2: Internal consistency VAMF (version 3) after eliminating 2 items.

Variable	Corrected item-total correlation	Cronbach's α
Total		0.836
<i>On removing items</i>		
(1) I feel happy when I am with my baby	0.461	0.827
(2) I feel overwhelmed when I am with my baby	0.262	0.833
(3) I like rocking or hugging my baby	0.293	0.833
(4) I feel proud when my baby does new things	0.157	0.836
(5) I like the time I spend with my baby	0.487	0.827
(6) I like to play with my baby	0.370	0.830
(7) I feel calm when I am with my baby	0.490	0.826
(8) Seeing my baby smile makes me happy	0.163	0.836
(9) My baby's cry irritates or annoys me or makes me feel helpless	0.274	0.835
(10) I find it difficult to separate from my baby	0.251	0.837
(11) I feel capable of identifying my baby's needs	0.258	0.835
(12) I like to talk to my baby	0.350	0.832
(13) Being with my baby makes me anxious and/or stressed	0.340	0.831
(14) I feel like I love my baby a lot	0.392	0.832
(15) Looking after my baby gives me satisfaction	0.474	0.827
(16) I don't feel caring with my baby	0.330	0.831
(17) My baby is calm when with me	0.526	0.825
(18) My baby smiles spontaneously	0.520	0.825
(19) My baby laughs when I play with them	0.528	0.825
(20) My baby maintains their gaze at me	0.477	0.827
(21) My baby is irritable or restless when not with me	0.110	0.840
(22) My baby perceives my feelings via my gestures and tone of voice	0.396	0.829
(23) My baby cries when I am no longer present	0.163	0.838
(24) My baby shows signs of happiness when seeing me again after a period of separation	0.503	0.824
(25) My baby calms when hearing my voice	0.543	0.823
(26) When I smile at my baby, my baby smiles back	0.502	0.825
(27) My baby tries to get my attention frequently	0.287	0.834
(28) My baby prefers to be in the crib or pram instead of my arms	0.104	0.837
(29) My baby expresses happiness at my displays of affection (hugs, kisses, etc.)	0.530	0.824

3.2.3. *Exploratory Factor Analysis.* The KMO test gave a value of 0.901, and the Bartlett test of sphericity was <0.001. Therefore, the EFA was carried out. Six components explained 49.71% of the variance. The first component consisted of items 18, 19, 20, 22, 24, 25, 26, 27, and 29 and represented 21.14% of the variance. The second component, made up of items 3, 5, 6, 12, 14, 15, and 16, explained 11.04% of the total variance. The third factor, made up of items 1, 2, 7, 9, 13, and 17, explained 6.09% of the variance. The fourth factor, made up of items 10, 21, and 23, represented 4.31% of the variance. The fifth factor, which includes items 8 and 28, explained 3.62% of the variance. The sixth factor, which includes items 4 and 11, explained 3.52% of the variance. In addition, all anti-image diagonal correlations showed figures greater than 0.750, except for items 23 and 25 with values of 0.659 and 0.660, respectively. Table 3 presents the items of the scale along with their respective factorial weights.

3.2.4. *Convergent Validity.* Next, convergent validity was studied with the MPAS scale, observing a statistically significant association ($p < 0.001$) with a Pearson correlation coefficient with a total scale of 0.679. This correlation was also studied when separating the items related to the bond and to the attachment, observing for the case of the bond,

a higher correlation coefficient of 0.766 and a lower attachment of 0.370.

3.2.5. *Predictive Validity.* In the case of predictive validity, it was decided to use the MPAS variable and use scores below the 10th percentile of the scale as the cut-off point, standing at 75 points. In this way, we determined the predictive capacity of the VAMF scale and the two attachment and bond subscales on the probability of having low scores on the MPAS. Observing that the VAMF scale, in the bond subscale, has an excellent predictive capacity for the MPAS scale with an area under the ROC curve of 0.90 (95% CI: 0.87–0.93), for the global VAMF scale, the predictive capacity was good with AUC of ROC of 0.85 (95% CI: 0.81–0.90), while the predictive capacity was poor if we used the attachment subscale with an AUC of ROC of 0.69 (95% CI: 0.63–0.76) (Figure 1). The Youden index was 98.5 points for the VAMF scale, 54.5 points for the VAMF-attachment subscale, and 40.5 points for its VAMF-attachment subscale.

3.2.6. *Criterion Validity.* For this analysis, we studied the relationship between various variables that could affect the condition of the mother and the newborn and their

TABLE 3: Rotated component matrix.

Item	Components					
	1	2	3	4	5	6
(1) I feel happy when I am with my baby	0.101	0.477	0.532	0.032	0.044	-0.041
(2) I feel overwhelmed when I am with my baby	-0.038	0.144	0.672	-0.015	0.012	-0.117
(3) I like rocking or hugging my baby	0.044	0.623	0.046	0.038	-0.045	-0.075
(4) I feel proud when my baby does new things	0.029	0.058	-0.067	0.066	0.357	0.730
(5) I like the time I spend with my baby	0.075	0.612	0.444	0.050	-0.044	0.089
(6) I like to play with my baby	0.074	0.644	0.181	-0.015	0.006	0.098
(7) I feel calm when I am with my baby	0.181	0.340	0.596	0.003	-0.003	0.157
(8) Seeing my baby smile makes me happy	0.042	0.259	-0.005	-0.048	0.304	0.080
(9) My baby's cry irritates or annoys me or makes me feel helpless	0.107	0.013	0.618	-0.065	-0.128	0.068
(10) I find it difficult to separate from my baby	0.027	0.304	0.071	0.487	-0.079	0.049
(11) I feel capable of identifying my baby's needs	0.188	0.097	0.155	-0.009	-0.226	0.609
(12) I like to talk to my baby	0.114	0.614	0.023	0.016	0.008	0.139
(13) Being with my baby makes me anxious and/or stressed	0.020	0.230	0.703	-0.105	0.189	-0.003
(14) I feel like I love my baby a lot	0.097	0.651	0.132	0.030	0.173	-0.032
(15) Looking after my baby gives me satisfaction	0.102	0.571	0.377	0.033	0.068	0.134
(16) I don't feel caring with my baby	0.144	0.390	0.252	0.029	0.167	-0.165
(17) My baby is calm when with me	0.419	0.155	0.475	0.071	0.013	0.201
(18) My baby smiles spontaneously	0.791	0.079	0.032	-0.050	0.032	0.037
(19) My baby laughs when I play with them	0.793	0.076	0.077	-0.105	0.030	0.045
(20) My baby maintains their gaze at me	0.688	0.135	0.021	-0.004	0.084	-0.021
(21) My baby is irritable or restless when not with me	0.027	-0.051	-0.047	0.755	0.042	0.028
(22) My baby perceives my feelings via my gestures and tone of voice	0.471	0.046	0.095	0.272	-0.110	0.115
(23) My baby cries when I am no longer present	0.108	-0.056	-0.075	0.785	0.086	-0.010
(24) My baby shows signs of happiness when seeing me again after a period of separation	0.673	0.065	0.057	0.218	0.002	0.044
(25) My baby calms when hearing my voice	0.513	0.122	0.303	0.231	-0.124	0.128
(26) When I smile at my baby, my baby smiles back	0.775	0.047	0.031	-0.022	-0.003	0.038
(27) My baby tries to get my attention frequently	0.469	0.035	-0.166	0.416	0.070	-0.104
(28) My baby prefers to be in the crib or pram instead of my arms	0.044	0.024	0.049	0.103	0.832	-0.018
(29) My baby expresses happiness at my displays of affection (hugs, kisses, etc.)	0.685	0.106	0.136	0.037	0.083	0.027

The bold values indicate the highest correlation between the variable and the component, and shows in which component the item is located.

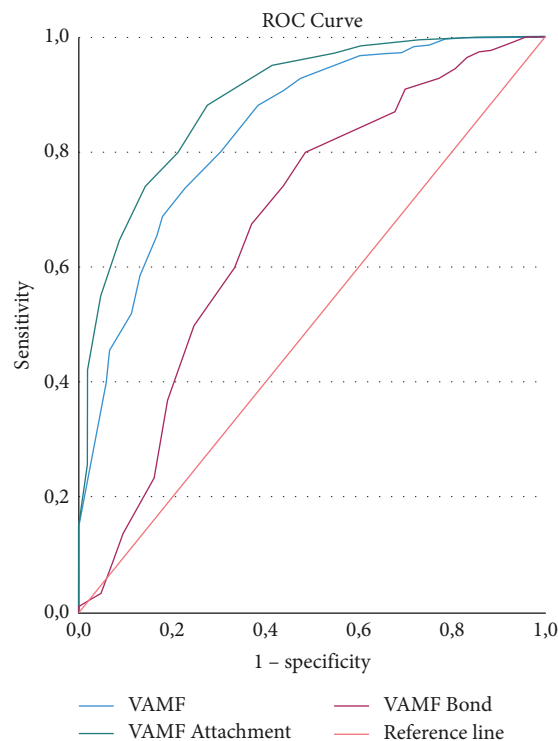


FIGURE 1: Predictive capacity of the VAMF questionnaire and the attachment and bond subscales for the MPAS scale for a percentile score of <10 (75 points).

relationship with the scores of the VAMF scale and the two attachment and bond subscales. As can be seen in Table 4, among the variables that could affect the maternal condition, we found a statistically significant association ($p < 0.05$) between the VAMF scale and the type of birth; postpartum complications; hospital admission days; health status in the 6 weeks postpartum; mental health problems; depression during pregnancy; tiredness or fatigue during pregnancy, childbirth, or postpartum; and anxiety during pregnancy, childbirth, or postpartum. Regarding the bond subscale, a statistically significant association ($p < 0.05$) was found with the variables type of birth; postpartum complications; days of hospital admission; ICU admission; state of health in the 6 weeks postpartum; mental health problems; depression during pregnancy; tiredness or fatigue during pregnancy, birth, and the postpartum period; and anxiety during pregnancy, birth, and the postpartum period. For its part, the score on the attachment subscale had a statistically significant association ($p < 0.05$) with the type of birth variable. In Table 5, the variables related to the newborn that have a statistically significant association ($p < 0.05$) with the total score of the VAMF scale were gestational age at the time of birth, hospital admission at birth, early initiation of breastfeeding, excessive crying, and colic of the infant. The bond subscale presented a statistically significant association ($p < 0.05$) with the variables hospital admission at birth, health problems, excessive crying, and infant colic. In contrast, the score on the attachment subscale showed a statistically significant association with the early onset of breastfeeding and colic of the infant. The skin-to-skin contact variable did not present a statistically significant association with the VAMF scale ($p = 0.233$) nor with the bond ($p = 0.114$) and attachment ($p = 0.722$) subscales.

4. Discussion

The VAMF questionnaire showed good internal consistency for the scale with 29 items. The EFA indicated that 49.71% of the variance of the VAMF was explained by dividing the items into 6 components. Convergent validity was studied with the MPAS scale [41], showing adequate correlation. Regarding predictive validity, the VAMF scale presented an excellent predictive capacity in the bond subscale and a poor predictive capacity in the attachment subscale. In the test-retest test, the VAMF showed good intraclass correlation.

The VAMF comprises two subscales, one for assessing the bond and the other for assessing the attachment. The total internal consistency of the VAMF was good ($\alpha = 0.836$), higher than that identified in the original version of the MPAS questionnaire [34], which measures bonds after birth, and showed an acceptable internal consistency with a Cronbach's α of 0.78. Also, the Spanish version of the MPAS adapted in 2016 by Riera-Martín et al. [41] presented an acceptable internal consistency, with a Cronbach's α of 0.75, lower than that found in our results. The PBQ [35], used to measure the postpartum bond, presented good internal consistency, with Cronbach's α ranging from 0.76 to 0.87 on the global scale, and the scores are in line with those identified in the VAMF. However, the Spanish version of the

PBQ, adapted and validated by García-Esteve et al. [44], obtained excellent internal consistency, with a Cronbach's α of 0.90 for the scale's total score, which is somewhat higher than that of the VAMF. In the convergent validity, compared to the MPAS scale, the VAMF presented a Pearson correlation coefficient of 0.679 for the total scale, showing a higher correlation in the bond subscale ($r = 0.766$) and lower for the attachment ($r = 0.370$). This correlation is in line with what each subscale measures, as the MPAS scale measures postnatal bonding, presenting a high correlation with the bonding subscale of the VAMF. In contrast, the attachment subscale measures a different phenomenon, with a poor correlation with the MPAS.

The analysis of the predictive validity showed an excellent predictive capacity in the bond subscale, while in the attachment subscale, it showed a poor predictive capacity, and these findings are in line with what was previously indicated. When using the MPAS scale for the analysis, as an instrument for measuring the postnatal bond with good psychometric capacities, it is seen that the predictive capacity of the questionnaire in the bond subscale is high, while the attachment subscale, which measures a reality closely related but different to the bond, shows a poor predictive ability. The predictive power of the global questionnaire is good. The PBQ questionnaire shows a positive predictive capacity of 0.79, varying with the presence and type of disorder in the relationship between mother and child, decreasing with the presence of rejection toward the child or maternal anger [35], and being poorer than that of the global VAMF questionnaire and much lower than that of the attachment subscale.

Regarding the maternal factors that are related to the scores of the VAMF questionnaire and its subscales, postpartum complications; hospital admission days; health status during the 6 weeks postpartum; mental health problems; depression during pregnancy; tiredness or fatigue during pregnancy, childbirth, and postpartum; and anxiety during pregnancy, childbirth, and postpartum had a statistically significant association with the VAMF global score. The bond subscale is related to the type of birth; postpartum complications; length of hospital admission; ICU admission; state of health in the 6 weeks postpartum; mental health problems; depression during pregnancy; tiredness or fatigue during pregnancy, birth, and postpartum period; and anxiety during pregnancy, birth, and postpartum. In the adaptation and validation of the Spanish version of the PBQ, a positive correlation was found between the presence of depressive symptoms and changes in the bond [44]. Likewise, Taylor et al. [38] found a relationship between depressive symptoms and mother-child bonding using the MIBS scales and the EDPS questionnaire, along with two other scales, showing that the presence of depression is related to worse bonding, which is in line with what was identified in our results. Likewise, the type of birth showed a correlation with the attachment subscale, which could be related to the increase in maternal oxytocin levels during childbirth, which could be a facilitator of mother-child attachment, related to the appearance of behaviors that favor bonding and maternal-filial attachment after childbirth, as

TABLE 4: Relationship between variables that affect the mother and the VAMF score, and the bond and connection subscales (criterion validity).

Variables related to the maternal condition	Attachment subscale		Bond subscale		VAMF scale	
	Mean (SD)	P value	Mean (SD)	P value	Mean (SD)	P value
N = 1155						
Type of birth		0.019		0.002		0.018
Normal	43.5 (4.41)		57.9 (3.64)		101.4 (6.49)	
Instrumental	42.7 (4.27)		58.0 (3.89)		100.8 (6.58)	
Scheduled cesarean	42.2 (4.74)		56.3 (3.89)		100.5 (7.31)	
Emergency cesarean	42.9 (5.19)		56.8 (4.99)		99.7 (8.60)	
Postpartum complications		0.662		<0.001		0.019
No	43.2 (4.59)		57.9 (3.86)		101.2 (6.89)	
Yes	43.1 (4.42)		56.8 (4.37)		99.9 (7.27)	
Length of hospital stay		0.177		0.050		0.053
One day	44.0 (4.02)		58.2 (3.49)		102.2 (6.19)	
Two days	43.3 (4.46)		57.8 (3.82)		101.1 (6.73)	
Three days	42.9 (4.73)		57.8 (4.06)		100.6 (6.96)	
Between 3 days and one week	43.0 (4.96)		56.9 (4.29)		99.9 (8.04)	
More than one week	42.3 (6.77)		56.1 (9.24)		98.4 (13.81)	
ICU admission		0.505		0.037		0.453
No	43.2 (4.56)		57.8 (3.89)		101.0 (6.90)	
Yes	43.9 (4.34)		55.8 (7.55)		99.7 (10.82)	
Health status during the 6 postpartum weeks		0.996		<0.001		0.002
Very bad	43.1 (4.78)		55.1 (6.96)		98.2 (10.70)	
Bad	43.1 (4.76)		56.8 (5.02)		99.9 (8.36)	
Ok	43.3 (4.52)		57.1 (4.17)		100.4 (7.30)	
Good	43.2 (4.51)		57.7 (3.52)		100.9 (6.40)	
Very good	43.2 (4.61)		58.8 (3.41)		102.0 (6.49)	
Mental health illness		0.201		<0.001		<0.001
No	43.3 (4.44)		58.1 (3.64)		101.4 (6.62)	
Yes	42.9 (4.91)		56.7 (4.71)		99.6 (7.81)	
Depression during pregnancy		0.244		0.009		0.024
No	43.3 (4.51)		57.9 (3.77)		101.1 (6.76)	
Yes	42.7 (4.99)		56.8 (5.46)		99.6 (8.61)	
Tiredness or fatigue during pregnancy, birth, and postpartum period		0.898		<0.001		0.008
No	43.2 (4.20)		59.4 (3.05)		102.5 (5.54)	
Yes	43.2 (4.60)		57.6 (4.03)		100.8 (7.10)	
Anxiety during pregnancy, birth, and postpartum period		0.687		<0.001		<0.001
No	43.3 (4.42)		58.7 (3.11)		102.0 (6.07)	
Yes	43.2 (4.70)		56.8 (4.49)		99.9 (7.66)	

The bold values should correspond with those that have reached statistical significance.

TABLE 5: Relationship between variables that affect the neonate and the VAMF score, and the bond and connection subscales (criterion validity).

Variables related to the neonate	Attachment subscale		Bond subscale		VAMF scale	
	Mean (SD)	P value	Mean (SD)	P value	Mean (SD)	P value
Gestational weeks at the time of birth		0.109		0.195		0.058
Term (≥ 37 weeks)	43.3 (4.50)		57.8 (3.85)		101.1 (6.83)	
Moderate preterm (32–37 weeks)	41.7 (5.65)		56.6 (6.16)		98.4 (9.54)	
Very preterm (28–32 weeks)	44.6 (3.41)		57.4 (1.13)		102.0 (4.12)	
Extreme preterm (<28 weeks)	42.5 (3.54)		59.5 (3.54)		102.0 (7.07)	
Hospital admission at birth		0.104		0.090		0.037
No	43.3 (4.47)		57.9 (3.84)		101.2 (6.73)	
Yes, in the neonatal unit	42.3 (5.18)		57.2 (5.08)		99.5 (8.90)	
Yes, in the neonatal intensive care unit	42.9 (5.07)		56.8 (4.04)		99.7 (7.27)	
Health problems		0.256		<0.001		0.211
No	43.2 (4.55)		57.9 (3.80)		101.1 (6.88)	
Yes	43.7 (4.62)		56.5 (5.13)		100.2 (7.75)	
Early initiation of breastfeeding		0.028		0.058		0.008
No	42.6 (4.93)		57.2 (4.90)		99.8 (8.17)	
Yes	43.4 (4.45)		57.9 (3.69)		101.3 (6.59)	
NA	41.9 (4.45)		57.0 (3.68)		98.9 (7.24)	
Skin-to-skin contact		0.722		0.114		0.233
No	43.0 (5.15)		57.3 (5.18)		100.4 (8.97)	
Yes	43.3 (4.44)		57.9 (3.69)		101.1 (6.51)	
NA	41.7 (6.51)		55.0 (4.36)		96.7 (10.69)	
Excessive crying		0.075		<0.001		<0.001
No	43.3 (4.45)		58.0 (3.77)		101.3 (6.70)	
Yes	42.4 (5.62)		54.9 (5.05)		97.3 (8.84)	
Newborn colic		<0.001		<0.001		<0.001
No	43.7 (4.30)		58.1 (3.63)		101.8 (6.50)	
Yes	43.0 (4.35)		57.5 (4.16)		100.5 (6.83)	
NA	40.6 (5.98)		55.9 (5.02)		96.5 (8.72)	

NA, not available/not known. The bold values should correspond with those that have reached statistical significance.

well as with the increase in cortisol levels [45]. In the newborn, there is a release of norepinephrine, cortisol, and vasopressin during the passage through the birth canal, where the increase in the concentration of adrenaline would be related to the formation of attachment, since these levels are related to olfactory learning after the birth [45]. Likewise, maternal feelings before childbirth and the possible consequences for the newborn play a fundamental role in establishing attachment [8]. On the other hand, newborn factors such as the gestational age at the time of birth, hospital admission at birth, early initiation of breastfeeding, excessive crying, and infant colic showed an association with the overall VAMF score. Focusing on both subscales, the bond subscale is associated with hospital admission at birth, newborn health problems, excessive crying, and infant colic, while the attachment subscale is associated with early onset of breastfeeding and infant colic. Skin-to-skin contact did not correlate with the VAMF scale or with any of its two subscales. After conducting a review of the literature, Olza-Fernández et al. [45] showed the benefits of skin-to-skin contact, being an essential part in the development of the mother-child relationship, since it helps the newborn in conserving energy, adjusting the acid-base balance, regulates respiration, and has a calming effect, as well as increases maternal attention to the newborn and reduces maternal cortisol levels. During skin-to-skin contact, an oxytocin discharge is produced, which is related to the increased

response of mothers to the signals emitted by the newborn and could play an important role in the initiation of breastfeeding [45]. Klaus and Kennell [46] in their “bonding theory,” affirmed that skin-to-skin contact was the determining factor for the development of the bond between the mother and the child. However, as has also been identified in our results, other authors, such as Myers [47], indicated that, while the premise that skin-to-skin contact is a determining factor is true, it is not the only one related to bond development.

4.1. Strengths and Limitations. The number of participants in this study was high, much greater than the minimum sample size calculated. The sample includes women from different regions of Spain, which is why possible linguistic, social, or cultural differences that may exist between these areas may be reflected. As it is a questionnaire, a possible selection bias associated with nonresponse must not be ruled out because the number of women who did not respond was very low. Although, there are no indications or reasons to suggest that the women who did not participate would have responded differently from those who did. The group of experts was made up of the different professional profiles that are involved in the attachment, bonding, and parenting process. These experts have extensive experience in teaching, clinical care, and research on the parenting, attachment, and bonding process. The

authors have already validated and designed instruments that are applied in the perinatal stage [48].

5. Conclusions

In conclusion, the VAMF is a new tool that presents good psychometric properties for measuring the mother-child bond and attachment in mothers and children aged between 6 weeks and 18 months and can be applied easily by professionals in the clinical-care setting. Due to its good psychometric capabilities, this tool could be systematically integrated into clinical practice in pediatric or pediatric nursing consultations. It could be employed as a routine component of the health assessment for a child, aimed at identifying any disruptions in the mother-child relationship between 6 weeks and 18 months of age. This approach would function as a screening mechanism, assisting healthcare professionals in early detection and enabling targeted interventions to strengthen the bond and attachment.

5.1. Relevance for Clinical Practice. The creation of the VAMF questionnaire will allow us to detect bond and attachment alterations in an easy and quick way by nurses and doctors in contact with mothers and children in the clinical practice. Early detection of suboptimal forms of bond and/or attachment will help medical staff to prevent negative consequences on mother-child dyads, such as mental health problems on mothers or difficulties in establishing new relationships in the future by the child. A future line of continuity with the topic is proposed in which the questionnaire is applied and the consequences and factors that are associated with the quality of the maternal-child bond and attachment are known.

Data Availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethical Approval

The Research Ethics Committee of the Province of Jaen approved this study at their meeting on November 25th, 2021 (DCVA-21/2012-N-21). All methods were carried out in accordance with relevant guidelines and regulations.

Consent

Informed consent was obtained from all participants.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Maria Antonia Diaz-Ogallar conceptualised and visualised the study, developed the methodology, performed the formal analysis, investigated the study, curated the data, wrote the original draft, and wrote, reviewed, and edited the study.

Antonio Hernandez-Martinez conceptualised the study, developed the methodology, performed the formal analysis, investigated the study, curated the data, wrote the original draft, and reviewed and edited the study. Manuel Linares-Abad conceptualised the study, developed the methodology, investigated the study, and reviewed and edited the study. Juan Miguel Martinez-Galiano conceptualised the study, developed the methodology, investigated the study, curated the data, supervised the study, administered the project, wrote the original draft, and reviewed and edited the study.

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Research Article

Determinants and Mitigating Factors of Brain Drain among Ghanaian Nurses: Insights from Nurse Managers in Northern Ghana—A Qualitative Inquiry

Mudasir Mohammed Ibrahim ¹, Abubakari Wuni ², Waliu Jawula Salisu ³,
Abdul-Malik Abdulai ¹, Theresah Owusua ⁴, Brenda Abena Nyarko ⁵,
Abdul-Malik Sayibu ³, Hannah Buasilenu ⁶, Abdulai Issahaka Baako ⁷,
and Iddrisu Sisala Mohammed ¹

¹Nurses' and Midwives' Training College, Tamale, Ghana

²College of Nursing, University of Kentucky, Lexington, KY, USA

³Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

⁴Catholic University of Ghana, Sunyani, Ghana

⁵Elaine Marieb College of Nursing, University of Massachusetts, Amherst, MA, USA

⁶Department of Child Health, Hopexchange Medical Center, Kumasi, Ghana

⁷St. Paul's Hospital, Ghana Health Service, Accra, Ghana

Correspondence should be addressed to Iddrisu Sisala Mohammed; sisala100@gmail.com

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Background. Nurse emigration, often termed “brain drain,” poses significant challenges to Ghana’s healthcare sector. **Aim.** This study explores nurse managers’ perspectives on determinants and strategies for mitigating nurse emigration in Northern Ghana. **Methods.** Sixteen nurse managers were interviewed using semistructured interviews between October and December 2023. Purposive sampling was used to select the participants. QDA Miner Lite version 6 was used for systematic coding and thematic data analysis, following the conventional content analysis approach. **Results.** Following data encoding and classification, the study identified three primary categories: determinants of brain drain, impact of brain drain on the healthcare system, and mitigating factors of brain drain. **Conclusion.** The study reveals that various factors, including inadequate pay, limited opportunities for career growth, and lack of access to technology, drive the brain drain among Ghanaian nurses. These lead to negative impacts on the healthcare system, such as increased workload, reduced patient satisfaction, and a shortage of skilled nurses. To tackle this issue, solutions including offering career advancement opportunities and improving salaries and working conditions among others have been highlighted to mitigate the brain drain among Ghanaian nurses.

1. Introduction

The migration of nurses, particularly from low- and middle-income countries to those with higher incomes, is a major global issue that has gained worldwide attention. Unfortunately, the recruitment tactics used by many of these low- and middle-income countries, especially in Africa, have made the situation worse as they face difficulties retaining

their nursing graduates who their educational institutions have trained [1].

This outflow of skilled professionals from developing countries to developed countries is commonly referred to as the “brain drain” [2]. The term was first used by the British Royal Society in the 1960s to describe the large departure of professional scientists, physicians, and university lecturers from developing countries. It has since become a major

concern globally [3, 4]. According to a 2015 report by the World Health Organization, developed countries are experiencing a severe shortage of healthcare workforce, despite dealing with an aging population and an increased prevalence of chronic illnesses. This shortage of highly skilled nurses is not only due to needs-based factors but also because of the high demand for nurses, which is expected to increase in the coming years. Consequently, it is highly likely that this high demand will severely deplete the pool of skilled nurses in developing countries [5].

Nurse migration has been observed across most Organization for Economic Co-operation and Development (OECD) countries, with a significant increase in the number of nurses migrating to these countries since the early 2000s. In fact, the numbers have more than doubled between 2000 and 2016. Additionally, between 2011 and 2018, the figures increased by about 20%, constituting over 7% of the nursing workforce in the OECD region. In 2021 alone, OECD countries employed an overwhelming 550,000 nurses [6, 7], indicating the need for constructive measures to manage this phenomenon effectively.

Ghana's history of migration is characterized by dynamic and multifaceted factors, deeply rooted in historical events and a tradition of population mobility. Urban migration, in particular, has played a pivotal role in livelihood strategies within the country. In the context of professional movement, nurses often transition across various levels of healthcare facilities, from rural to urban settings, and from clinical and research roles to administrative positions [8, 9].

Recent policy shifts in Ghanaian healthcare, such as initiatives aimed at improving salaries, enhancing working conditions, and providing career advancement opportunities, have attempted to mitigate nurse emigration [10, 11]. However, the effectiveness of these policies in addressing the root causes of nurse migration remains a critical concern [3, 12].

Despite significant advancements in the Ghanaian healthcare system over the past three decades [13], the country grapples with a substantial loss of healthcare professionals to foreign countries, presenting a critical challenge [14].

A considerable number of Ghanaian nurses choose to migrate to developed countries such as the United Kingdom, the United States, Australia, Canada, and more recently, Barbados and the United Arab Emirates, in pursuit of better job opportunities [15]. According to the Ghana Registered Nurses' and Midwives' Association, over 6,000 Ghanaian nurses have relocated to foreign countries within a two-year period, with an additional 14,000 nurses seeking financial clearance for the same purpose [16]. This trend is further underscored by data from the United Kingdom's National Health Service (NHS), which recorded a notable increase in the number of healthcare workers, including nurses, with Ghanaian heritage [10]. According to Iddrisu [17], about 60% of Ghanaian nurses harbor intentions to leave the country and seek employment opportunities elsewhere.

The decision of nurses to migrate is influenced by a complex interplay of push and pull factors. Pull factors pertain to attractive conditions present in the health systems

of destination countries, while push factors refer to undesirable features of the healthcare systems in origin countries [18]. In Ghana, a range of push factors, including low salaries, limited access to modern technology, restricted educational opportunities, low job satisfaction, and political instability, contribute to nurses' motivation to seek opportunities abroad [3, 18, 19]. Failure to address this trend could lead to increased clinical workloads, decreased quality of care, and heightened mortality and morbidity rates due to reduced access to essential healthcare services [5, 20]. Given the urgency of this issue, this qualitative study was conducted to explore the perspectives of nurse managers regarding the determinants and mitigating factors of nurse migration, specifically focusing on Northern Ghana.

2. Methods

This qualitative study used a conventional content analysis approach to delve into the contributing and mitigating factors of nurse migration in Ghana. Content analysis was deemed appropriate as it is suited for describing phenomena with limited understanding or fragmented knowledge about them [21, 22]. Given the ambiguous nature of the phenomenon of nurse brain drain in Northern Ghana, content analysis was chosen to bring clarity and insight into this complex issue.

Participating nurse managers were purposefully selected from three hospitals in Tamale (Tamale Teaching Hospital, Seventh Day Adventist, and Tamale West Hospital), the capital city of the Northern Region. Participants were purposefully selected from different departments within each hospital. The study included 16 participants, 9 females and 7 males, all with a minimum of 5 years of managerial experience. The sample size of sixteen was determined based on the principle of data saturation, where we observed that no new insights were emerging from additional interviews, ensuring that the sample size was sufficient to capture the breadth and depth of perspectives on the topic. The criteria for selecting participants included factors such as years of managerial experience (minimum 5 years), current active service in clinical or managerial roles, and willingness or consent to participate. The study relied on nurse managers for their frontline leadership roles and extensive workforce experience, aiming to comprehensively understand and address the issue of nurse attrition in the region.

Data were collected through in-depth face-to-face interviews that lasted 45 to 60 minutes. The interviews were conducted in quiet settings in participants' offices, as they mostly preferred.

The interview process commenced with questions aligned with the study's objectives, followed by probing inquiries to delve deeper into specific aspects. Each interview began with an open-ended question, such as, "As a nurse manager, could you share your insights on the issue of brain drain among nurses?" This approach fostered comprehensive discussions and elicited rich qualitative data. Depending on the responses, further probing questions were asked. The data collection continued until data saturation was reached, ensuring comprehensive coverage of relevant insights.

The data analysis employed a conventional approach without predetermined categorization structures. This method unfolded over three phases: preparation, organization, and report writing. Initially, in the preparation phase, each interview served as a unit of analysis. Transcripts were meticulously transcribed verbatim and iteratively reviewed to grasp overarching categories.

All audio recordings were transcribed verbatim by two independent transcribers to ensure accuracy. The transcripts were then imported into a qualitative data analysis software, QDA Miner Lite version 6, for systematic coding and thematic analysis. To begin the analysis, the researchers engaged in open coding, wherein initial concepts and patterns were identified. Axial coding was employed to categorize and relate codes to each other, allowing for the emergence of preliminary themes.

During the organization phase, units of meaning within each interview were identified, condensed, and openly coded. Similar codes were then grouped into subcategories and overarching main categories. Finally, in the reporting phase, the latent meaning of the data was presented as the study's results [23].

Efforts were made to ensure the reliability and confirmability of the findings. The credibility of the findings was further bolstered by meticulous attention to the content analysis process, including selecting meaningful units, categorizing data, and recognizing similarities and differences among categories. To this end, ample time was dedicated to data collection and analysis. A member check was also conducted (Graneheim & Lundman, 2004), and two other authors independently reviewed the data for peer validation.

The team obtained ethical clearance from the Tamale Teaching Hospital ethical unit with reference number TTH/R&D/SR/267. Before the interviews, participants received detailed information about the study, including its objectives, potential risks, and benefits. Each participant provided informed consent, ensuring their voluntary and confidential participation in the study.

3. Results

In this study, a diverse group of participants contributed valuable insights, enabling the authors to draw meaningful conclusions regarding the brain drain phenomenon in Ghana. Table 1 presents the demographic data of the participants. The analysis of the findings highlighted three major categories along with 12 subcategories, as seen in Figure 1.

3.1. Determinants of the Brain Drain. The determinants of brain drain have emerged as one of the main categories, highlighting the factors that drive the phenomenon of brain drain. Understanding these determinants is crucial for policymakers and researchers aiming to address and mitigate the consequences of brain drain. It explores the complex interactions between factors influencing the brain drain issue in Ghana, focusing on four subcategories: Financial

Challenges and Incentives, Professional Environment and Support, Healthcare System and Dynamics, and Technology and Innovation.

3.1.1. Financial Challenges and Incentives. All the participants in this study revealed that one of the main reasons for nurses leaving the country is the financial challenges and incentives. Nurses' earnings are inadequate for significant expenses such as buying a car or a house. To achieve such goals, nurses often have to take high-interest loans, which causes financial strain. As a result, in retirement, nurses often face difficult living conditions. On the other hand, it was noted that nurses who have migrated to foreign countries have better economic prospects and can often achieve their goals. They can enjoy a better quality of life and often return to their home country to contribute significantly. Also, some participants mentioned delayed promotions, the search for a better life for themselves and family, and the absence of health insurance coverage as the reasons why nurses travel out of the country.

"I think our salary is just from hand to mouth. Before you can do any big project, you have to go for a loan. Before you get a house or car, you have to go for a loan and if you look at those nurses who have retired, their living conditions are not that appreciable. I have seen a colleague who has gone outside for less than two years and things have changed. He is able to get a house and he has his own car. 'Why won't you also want to go and get those things?'" (Participant 5).

"They will send the money home so that they will take good care of the family they have left" (Participant 3).

"There is no proper health insurance for workers who work in hospitals. When you are sick, you still have to take care of yourself and pay out of pocket" (Participant 14).

3.1.2. Professional Environment and Support. Our findings showed that nurses are undervalued and disrespected in the healthcare sector, a significant factor driving their emigration. The difference in status between medical doctors and nurses is one reason for this, as several participants pointed out. They emphasised that even when a nurse has advanced degrees and extensive experience exceeding that of a newly qualified medical doctor, healthcare facilities often fail to acknowledge their expertise, and the nurse is unable to attain a position of authority or denied a promotion to merit their experience. This is in contrast to doctors who are frequently promoted to higher ranks. It is high time that healthcare organizations recognize the qualifications and expertise of nurses and treat them with the respect they deserve. During the interviews, several participants expressed that the government policy mandates that a nurse who serves for a certain number of years should be given a study leave to pursue further programs if they wish to. Participants noted that workplace bullying and discrimination against nurses were prevalent in most health facilities, contributing to an unpleasant work environment.

TABLE 1: The sociodemographic profile of the participants in this study.

Participant	Age in years	Gender	Work experience	Qualification	Considering or intending to work abroad
Participant 1	58	Female	24	Bachelors	No
Participant 2	48	Female	25	Bachelors	No
Participant 3	56	Female	31	Bachelors	No
Participant 4	40	Female	16	Masters	Yes
Participant 5	35	Male	10	Bachelors	Yes
Participant 6	33	Male	6	Masters	Yes
Participant 7	41	Male	14	Bachelors	Yes
Participant 8	38	Male	13	Bachelors	Yes
Participant 9	36	Male	14	Masters	Yes
Participant 10	42	Female	13	Masters	Yes
Participant 11	36	Female	13	Masters	Yes
Participant 12	39	Female	14	Masters	Yes
Participant 13	39	Female	18	Masters	Yes
Participant 14	39	Male	14	PhD	Yes
Participant 15	40	Male	17	Bachelors	No
Participant 16	37	Female	10	Masters	Yes
Mean \pm SD or total (%)	41.0 \pm 7.1	Female: 9 (56.2%) Male: 7 (43.8%)	16.0 \pm 6.3	Bachelors: 7 (43.8%) Masters: 8 (50.0%) PhD: 1 (6.2%)	Yes: 12 (75.0%) No: 4 (25.0%)

Source: field data (2023).

“When a nurse goes to school to acquire higher degrees and comes back, the highest rank they can attain is a chief nursing officer in the institution. They cannot go any higher” (Participant 3).

“You go to a district hospital where there is a medical superintendent. The medical superintendent has completed medical school, done his housemanship for just two years and comes out as a medical doctor. Whereas there is a nurse, who has been working there for more than 20 years and has experience sometimes to the extent that some have higher degrees than the medical doctor. They still become subservient. The only way the government can stop nurses from going outside the country is when they start to see nurses as important and pivotal in the health delivery” (Participant 9).

“Then also, there are a lot of bureaucratic systems in place in our society. So, the government says that when you work a certain number of years, you should be allowed to go and get upgraded. You should go to school [...] People have worked ten years, and they are still chasing study leave” (Participant 6).

...“So, for me, the main factor is bullying in the system and among us as nurses. It might come out subtly as if it is not there, but it’s a big issue” (Participant 11). “[...] I see nurses discriminated against, and so they leave the shores of the country. For now, I don’t see any good policy for nurses, which explains why people are leaving” (Participant 15).

3.1.3. Healthcare System Policies and Dynamics. Participants voiced concerns about the inadequate availability of essential logistics required for life-saving procedures. Furthermore, despite acquiring additional training in specialised skills, some nurses continue to face obstacles in accessing the necessary equipment. These collective challenges demotivate them, fueling a growing inclination to explore practice opportunities in other countries. The participants also cited their organization’s lack of interaction with employees to address issues, the government’s recent policy to export nurses, and the delay in recruitment of graduate nurses as significant factors propelling nurses to leave the country. Participants emphasised the importance of feeling respected and recognized in their professional endeavours, which does seem to exist.

“You need consumables (such as gloves, cannulas, and syringes), but they are not there. When the patient comes in an emergency state, you have to write for a relative to go and buy it before you can attend to the person. You look at the patient as helpless but can’t do anything. Common oxygen flow meters, you won’t get them. You go, and then they ask you questions such as, “What are you using it for?” It’s frustrating” (Participant 12).

“Even the government encourages the exodus of nurses; they started thinking they had enough and have been exporting to Barbados. So now, people have gone to Barbados, and they have realised that it is better there, so they are unwilling to return” (Participant 9).

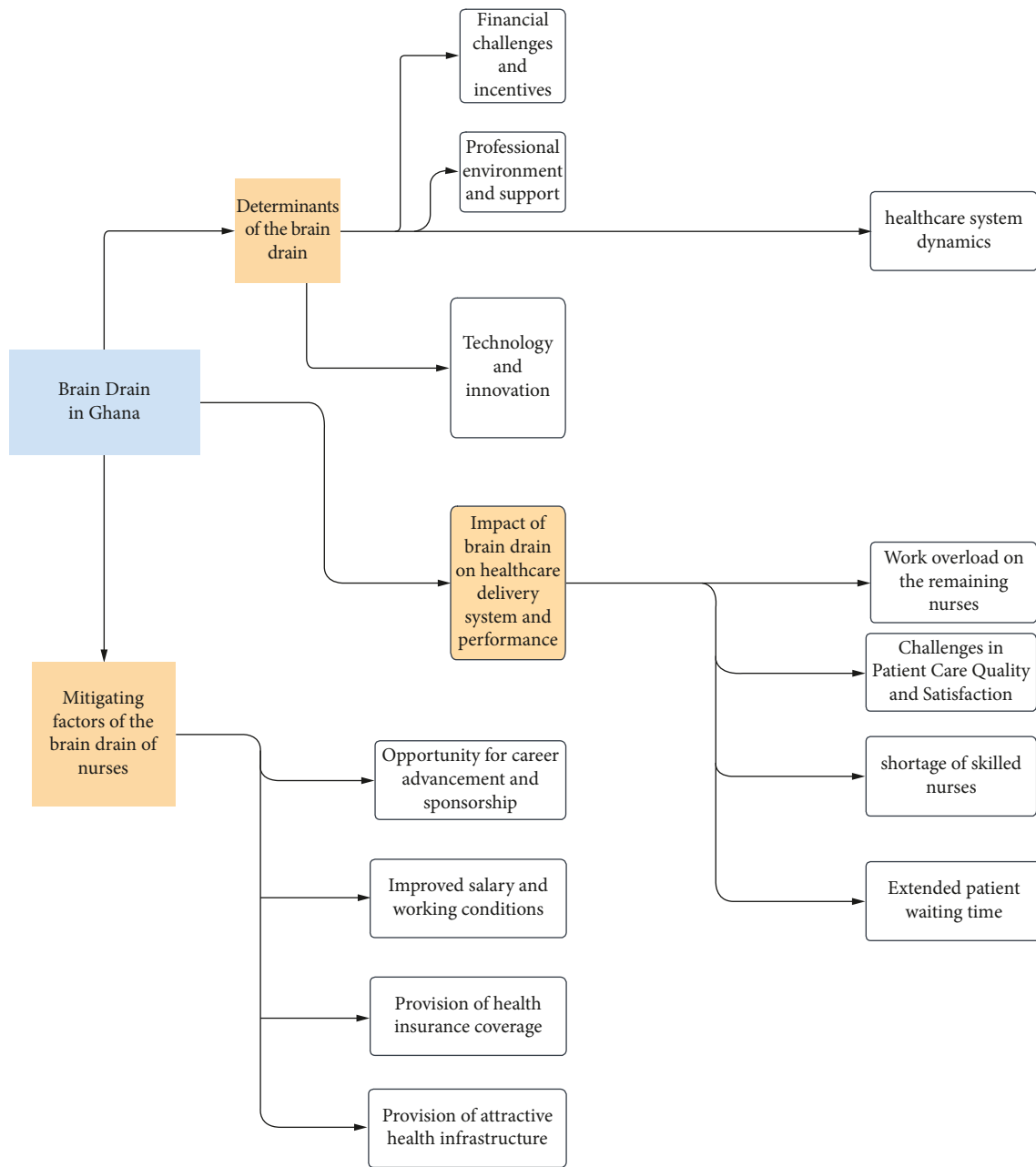


FIGURE 1: Categories and subcategories that emerged from the interview data.

3.1.4. *Technology and Innovation.* According to our findings, one of the main reasons why nurses are leaving their home countries is their curiosity about modern technology. Many nurses are highly motivated to practice in other countries after seeing the technological advancements on television and social media.

Although they may rely on manual methods in their home countries, they aspire to experience the technologically advanced lifestyle available in foreign countries. This curiosity becomes a compelling driving force for them.

“We see it on TV and on social media that this time, this is the current trend that is going on, and we are still doing the old-fashioned things. Sometimes, out of curiosity, you will want to go and taste life on the other side of the island” (Participant 2).

3.2. *Impact of Brain Drain on Healthcare Delivery System and Performance.* One of the major categories was the impact of brain drain on the healthcare delivery system and performance. The findings unveil the multifaceted repercussions of

brain drain on healthcare provision, shedding light on healthcare systems' complexities. The subcategories included the Shortage of Skilled Nurses, Challenges of Patient Care Quality and Satisfaction, Work Overload on Remaining Nurses, and Extended Patient Waiting Time.

3.2.1. Shortage of Skilled Nurses. Our findings indicate that nurses with significant expertise and experience are predominantly those leaving the country. Participants underscored the substantial loss incurred by the departure of these experienced nurses, emphasising the critical benefits of retaining them, mainly as patient care demands have heightened in recent years. Furthermore, they highlighted the potential risks to the country's ability to meet its targets for the Sustainable Development Goals (SDGs) if the shortage of skilled nurses within the healthcare system persists. The ongoing exodus of proficient nurses could severely undermine the healthcare system's capacity to deliver quality care, impeding progress towards achieving the SDGs. This scenario necessitates urgent attention and strategic interventions from policymakers to mitigate the adverse impacts and ensure a stable and competent nursing workforce.

"...It is affecting the nursing profession in Ghana; those who have the experience and knowledge in nursing are rather leaving. Meanwhile, they have been trained by the Government of Ghana" (Participant 8).

"Of course, we have international standards to follow like the SDGs and we need skilled nurses to help us achieve such goals. So, if all the skilled nurses are leaving the country, leaving the less. It will affect our achievement of the SDGs" (Participant 5).

3.2.2. Challenges in Patient Care Quality and Satisfaction. The reduced compensation and increased workload could lead to the remaining nurses inadvertently expressing frustration towards patients, resulting in dissatisfaction with the care provided. Furthermore, there is concern about the potential decline in patient care standards due to the insufficient training of other cadres of nurses who may likely remain after most registered nurses have migrated. These staff may face challenges in implementing proper care plans, ultimately affecting patient care quality.

"If there is more work and less pay, you will become frustrated. Some of us cannot hide our frustrations. We will also extend it to our clients. So, the clients will come and they are not satisfied with whatever activities or care that we have rendered to them rendering the whole health system useless because our optimum goal is to make our clients satisfied" (Participant 2).

"Nursing care plan has been one of the things that we want to implement but we are not able to do it because of the cadre of staff. The few diploma nurses with the volume of certificate nurses who they have, they don't learn it [...] and for you to implement the nursing care plan, it needs

much attention [...] So, there is no way that they will be able to master it to be able to provide proper care, so low standard of care. That is what we are all wailing at, the low standard of care" (Participant 4).

3.2.3. Work Overload on the Remaining Nurses. Many participants emphasised that a significant consequence of nurses migrating abroad is the increased workload placed on the remaining nursing staff, adversely affecting their well-being. This augmented strain frequently impedes these nurses from dedicating adequate time to deliver the level of care that patients require. The overburdened staff face heightened stress levels, which can lead to burnout, decreased job satisfaction, and, ultimately, a further reduction in the quality of patient care. Additionally, the diminished workforce may struggle to maintain standard care protocols, potentially resulting in higher rates of medical errors and compromised patient outcomes. This scenario underscores the urgent need for strategies to support the remaining nursing staff, such as improving working conditions, ensuring adequate staffing levels, and providing mental health resources to sustain both nurse and patient well-being.

"It is affecting us because the number of nurses is reducing and that is putting a strain on the remaining staff, eventually affecting the care we give to our patients" (Participant 1).

Additionally, nurses' workload will include mentoring newly recruited nurses, as they represent the remaining pool of experienced nursing staff.

"The burden on them would be like mentorship because that means that we have employed more like recruited new nurses, and they the few ones left have to begin to mentor them" (Participant 16).

3.2.4. Extended Patient Waiting Time. The participants observed that insufficient nursing staff attending to patients would result in longer wait times. This issue arises because the limited nursing workforce is required to complete ward rounds and other activities before they can address the needs of patients in critical areas, such as the Outpatient Departments (OPDs). Consequently, the time-sensitive demands of patients requiring immediate attention may not be met promptly, exacerbating patient dissatisfaction and potentially compromising patient outcomes. The cascading effects of these delays can strain the entire healthcare system, highlighting the critical need for adequate staffing to ensure efficient and effective patient care. Ensuring sufficient nursing personnel is essential for maintaining the flow of care delivery and upholding the standards of healthcare services.

"[...] If we are many, at least some will be at the ward to carry out the rounds, and some will be at the OPD to take care of the patients. But if the numbers reduce, it will be like some few or one person. The person has to go forward

rounds, finish, and then come to the OPD and attend to those waiting. So, the waiting time will increase automatically” (Participant 12).

3.3. Mitigating Factors of the Brain Drain of Nurses. The third and final main category identified in this study was the mitigating factors of nurse brain drain, encompassing four subcategories: Opportunities for Career Advancement and Sponsorship, Improved Salary and Working Conditions, Provision of Attractive Health Infrastructure and Policies, and Provision of Health Insurance Coverage. Mitigating factors are crucial in addressing the brain drain of nurses. Critical insights into practical strategies for retention and recruitment within the nursing profession were uncovered through this research.

By analyzing these factors, this study illuminates actionable pathways for mitigating the adverse effects of nurse brain drain, ultimately contributing to enhancing healthcare delivery systems in Ghana. Implementing these strategies can foster a more stable and satisfied nursing workforce, which is essential for achieving sustainable improvements in healthcare quality and accessibility.

3.3.1. Opportunity for Career Advancement and Sponsorships. Numerous participants emphasised the importance of providing career advancement opportunities for deserving nursing staff as a strategic measure to minimise nurse migration. They suggested that these opportunities should include full or partial sponsorship for the desired programs, thereby enhancing nursing personnel’s professional development and retention. By investing in the career growth of nurses, healthcare institutions can foster a more committed and skilled workforce, reducing the propensity for migration and ensuring better continuity of care within the healthcare system.

“If opportunities are given to deserving staff to pursue their career, they may stay” (Participant 5).

“Career development and advancement could help if only it will come with good incentives. As I stated, for instance, If I am going to develop myself [...] and then all my fees are gone by 50% [...] Why would I go? I would stay” (Participant 9).

3.3.2. Improved Salary and Working Conditions. Consistently, all participants proposed that a key strategy for addressing nursing migration is for the government to enhance nurses’ salaries and working conditions. Improved compensation and working environments would strongly incentivise nurses to remain in the country. To mitigate the impact of the brain drain phenomenon, participants suggested that healthcare facilities should offer on-site accommodation to nurses. Additionally, participants recommended that the government introduce policies to standardise wages, ensuring fair and competitive compensation across the healthcare sector. These measures would

improve nurse retention and promote a more stable and effective healthcare system.

“The solutions are to improve nurses’ salary and working conditions. If nurses’ working conditions are improved, many people will not go away. When you are in your town or city, life will be better than going outside” (Participant 8).

The participants also emphasised the importance of incentivising nurses working in remote areas. This is particularly significant due to the numerous challenges faced by these nurses, including inadequate access to basic necessities such as clean drinking water and electricity and poor road infrastructure. Providing additional incentives for nurses in these regions would acknowledge their unique hardships, encourage retention, and improve the quality of healthcare services in underserved areas.

“Trained nurses don’t want to go to some places to work mainly because the roads are terrible. If you have your family living in the city then you have to always travel all the way down” (Participant 11).

3.3.3. Provision of Attractive Health Infrastructure and Policies. Several participants suggested the government renovate aging hospital buildings to enhance their appeal. They also emphasised the importance of constructing new hospitals and facilities to ensure efficient patient management. It is crucial to ensure that basic items required for patient care are readily available in healthcare facilities. Furthermore, three of the sixteen participants proposed reinstating a commitment or bonding mechanism for nurses after completing their training. This measure could reduce the number of nurses who migrate abroad, helping retain skilled healthcare professionals within the country.

“Government should make our hospitals attractive. The hospitals are old and there are no new buildings. At times it is the beauty of the hospital that attracts somebody to go and work there” (Participant 3).

“There should be policies in place that when you finish nursing school, you should serve the country for this number of years. After that, if you choose to leave, that’s okay. But then it should be such that by the time those people decide to leave, you have people that have been trained also like mentorships. Then any point they exit, they have another set that can take care of the system” (Participant 11).

3.3.4. Provision of Health Insurance Coverage. Participants suggested that the government’s implementation of a comprehensive health insurance policy for healthcare workers could significantly enhance nurse retention.

By providing robust health insurance coverage, the government would address a critical aspect of job

satisfaction and security, thereby reducing the incentive for nurses to seek employment opportunities abroad. Comprehensive health insurance would improve the overall well-being of healthcare workers and demonstrate a tangible commitment to their welfare, which is essential for fostering a loyal and dedicated workforce. This policy could be a pivotal component in a broader strategy aimed at mitigating the adverse effects of brain drain within the nursing profession.

“Another expectation is that if the government comes up with a policy that helps workers maybe health insurance policy [...] that can also help them to stay [...]” (Participant 10).

4. Discussion

This study explored nurse managers' perspectives on the factors influencing and potential solutions for the brain drain of nurses in Northern Ghana. The multifaceted nature of this phenomenon indicates that migration is not driven by a single factor alone. Financial challenges, opportunities for professional growth, social considerations, workplace conditions, and political factors all play significant roles in nurses' decisions to migrate. The findings highlight the issue's complexity, underscoring the need for comprehensive and multifactorial strategies to effectively address the brain drain in the nursing sector [24].

Our research found that economic factors, such as low salaries and the desire to provide a better life for their families, are significant contributors to the nursing brain drain. These findings align with previous studies, which have similarly identified meagre salaries [3, 11, 25–27] and the desire to secure a better life for family [10, 28] as primary reasons for nurses leaving their home countries. Similarly, Lanati and Thiele [29] revealed nurses' migration is largely due to push factors such as economic challenges (low average salary) and pull factors including higher wages, improved quality of life, growing economy, and prestigious educational opportunities.

Moreover, this research underscores the critical role of working conditions in exacerbating nurse emigration, contributing significantly to brain drain. Previous studies consistently underscore the pivotal role of the work environment on nurses' decisions to seek opportunities abroad. For example, recent research elucidated how the scarcity of essential consumables and equipment is a compelling factor driving nurses to relocate to other nations—a finding congruent with existing literature [30, 31].

Improving workplace conditions and introducing effective financial incentives are crucial to minimising nurse migration issues due to economic factors and challenging work environments. This dual approach addresses nurses' financial needs and job satisfaction, fostering retention and strengthening healthcare systems.

Furthermore, the absence of opportunities for skill enhancement and career advancement, coupled with delays in promotions, has been identified as a key driver of nurse migrations. This finding reinforces the conclusions from

comparable studies on the subject [10, 11, 32]. The government and the Ministry of Health should consider addressing this issue to tackle the challenges posed by brain drain in the country.

In our recent study, political factors, such as delays in recruiting graduate nurses and the recent policy of exporting nurses, emerged as significant determinants of nurse brain drain. This finding resonates with the research conducted by Poku et al. [10] which highlighted how political decisions impact nurse migration. Specifically, nursing graduates often face prolonged periods of unemployment, waiting over two years before securing a job due to bureaucratic delays. The recent practice of nurse exportation by the government makes nurses perceive an oversupply of trained professionals, further encouraging migration. To address this issue, policymakers should consider implementing reforms to streamline the recruitment process for nursing graduates, reduce waiting times for employment, and enhance transparency in government policies regarding nurse exports. Providing clear information on the rationale behind such decisions can help alleviate concerns and discourage unnecessary migration, ultimately mitigating nurse brain drain.

Our findings highlight that brain drain exacerbates work overload among remaining nurses, diminishing patient satisfaction. As nurses pursue better opportunities abroad, the patient-to-nurse ratio increases, necessitating the remaining staff to shoulder the workload. This finding resonates with similar studies by Yuksekdog [33]; Poku et al. [10]; Kadel and Bhandari [34]; and Rolle et al. [35], which have all documented the added burden on nursing personnel during periods of brain drain. Increased nurse workload is linked to reduced patient satisfaction and poorer outcomes [36, 37]. This correlation underscores the importance of advocating for humanistic care in nursing practice.

By fostering a culture of empathy and patient-centred care, we can strengthen the nurse-patient relationship, elevate the quality of nursing services, enhance patient satisfaction, and bolster professional recognition for nurses [38].

The present study revealed that the brain drain among nurses leads to newly trained nurses being introduced into the healthcare system with fewer experienced mentors available. Experienced nurses who leave take with them valuable knowledge and skills acquired over years of practice, leaving newly recruited nurses without the necessary expertise and guidance. Evidence indicates that patients' perceptions of hospital care are strongly associated with missed nursing care, directly related to inadequate professional nurse staffing [39–41]. For example, the study conducted by Karaca and Durna [42] revealed that patients were more satisfied with the care provided by experienced nurses, as the nursing care they received during hospitalisation was excellent. Therefore, the government could set up mentorship programs, supportive work environments, and opportunities for continuous training and skill development so that the remaining nurses can advance their knowledge and skills to provide quality care to patients.

Our research underscores that the continual migration of nurses poses a significant obstacle to attaining the Sustainable Development Goals (SDGs). This challenge is closely tied to the International Council of Nurses [43] assertion that nurses play a pivotal role in achieving the SDGs and that without adequate investment in the nursing profession, success in these global objectives is unattainable. The SDGs, established in September 2015 with the initiative of the World Health Organization (WHO), aim to foster measurable progress across social, economic, and environmental dimensions by 2030. Nurses are vital to this endeavour, serving as primary healthcare providers in all communities and settings. Their crucial role is highlighted by the fact that they outnumber doctors by nearly three to one [44]. However, an uneven distribution of nursing personnel weakens health systems, as Peters et al. [37] noted, ultimately hindering SDG targets' achievement. Addressing the challenges of nurse migration is crucial for the sustainability of healthcare systems and for realising the broader goals of global development outlined in the SDGs.

This study found that ongoing nurse brain drain increases patient waiting time. This may be explained by the reduced number of nurses in the healthcare system and hospitals when they migrate to foreign countries, especially in the absence of active recruitment efforts to replace those who have left. Waiting time indicates the quality of healthcare services [45, 46]. Prolonged waiting times significantly contribute to patient dissatisfaction [47, 48] and can have negative impacts on patient adherence to medication treatment regimens, clinical outcomes, the likelihood of patients returning to see their care providers, and the probability of patients recommending their care providers to others [49].

The current study underscores the pivotal role of government initiatives in creating an empowering work environment conducive to nurse retention. A predominant theme among participants was the desire for support in continuing their education through training and avenues for career advancement. They believed such support would enhance their personal development and professional standing and enable them to serve their communities better. This sentiment aligns with findings from research by Iwu [50] and Lartey et al. [51] which highlighted the effectiveness of providing opportunities for continuing education, career progression, and fostering a supportive workplace culture in stemming the nursing exodus. Furthermore, insights from Poudel et al.'s [52] study on nurses in preregistration programs in Nepal shed light on the motivations behind migration aspirations. The majority desired to migrate, with many citing access to educational opportunities abroad as a primary driver. However, they agreed they would stay in their home country if similar educational prospects were available locally. This underscores the importance of not only providing educational opportunities but also ensuring their accessibility to nurses, thereby fostering retention and mitigating the urge to migrate.

A significant finding of this study is that providing accommodation for nurses could be an effective strategy to mitigate brain drain. When implemented by healthcare

organizations, this practical solution alleviates the financial burden of renting from external landlords and allows nurses to concentrate more fully on their professional responsibilities. These findings, in line with the research conducted by Adzei and Atinga [53], underscore the importance of housing as a crucial incentive for retaining healthcare personnel within a nation, providing healthcare administrators, policymakers, and researchers with actionable insights [54].

5. Conclusion

The study underscores numerous factors contributing to the emigration of Ghanaian nurses, which consequently leads to significant adverse effects on the healthcare system. These include heightened workload among remaining nurses [55], diminished patient satisfaction, lowered standards of care, a shortage of skilled professionals, impeded progress towards Sustainable Development Goals (SDGs), and prolonged patient waiting times. Effectively addressing this challenge necessitates a comprehensive approach. This involves implementing various potential solutions, such as offering career advancement pathways, enhancing salary and working conditions, bolstering health infrastructure, ensuring equitable pay, providing health insurance coverage, maintaining adequate supplies of consumables and equipment, offering accommodation support, and implementing bonding arrangements. It is crucial to address these multifaceted issues comprehensively to mitigate nurse brain drain and strengthen the resilience of Ghana's healthcare system.

5.1. Limitations of the Study. While this study shed light on the determinants and mitigating factors of the brain drain among Ghanaian nurses, it focused only on nurse managers in Northern Ghana, restricting the generalizability of the findings to a broader population of Ghanaian nurses. Also, there might be bias in selecting participants, especially if nurse managers who agreed to participate have distinct views or experiences compared to those who declined.

Data Availability

The data supporting the conclusions of this study are available upon request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

M.M.I., A.W., T.O., B.A.N., A.S., H.B., A.A., A.I.B., I.S.M., and W.J.S. were responsible for conceptualization and review and editing. M.M.I., I.S.M., T.O., and A.S. were responsible for data curation. M.M.I., T.O., A.W., and W.J.S. were responsible for formal analysis. M.M.I., A.W., and I.S.M. were responsible for funding acquisition. B.A.N., A.S., H.B., A.A., A.I.B., and I.S.M. were responsible for

investigation. A.W., B.A.N., A.I.B., and W.J.S. were responsible for methodology. H.B., M.M.I., I.S.M., and A.I.B. were responsible for project administration. M.M.I., A.W., T.O., and I.S.M. were responsible for resources. M.M.I. was responsible for software. A.S., H.B., A.A., and A.I.B. were responsible for supervision. A.W., W.J.S., and A.A. were responsible for validation. M.M.I., A.W., and W.J.S. were responsible for visualization. M.M.I., I.S.M., B.A.N., A.W., and W.J.S. were responsible for original draft preparation.

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Research Article

Determinants of Evidence Implementation by Nurses: #Evidencer Model for the Use of Evidence-Based Practice (#EvidencerMUSEBP)—A Structural Equation Model

Maria Ruzafa-Martínez ¹, Serafin Fernández-Salazar ², César Leal-Costa ¹,
and Antonio Jesús Ramos-Morcillo ¹

¹University of Murcia, Department of Nursing, El Palmar 30120, Murcia, Spain

²Andalusia Care Strategy, Andalusian Health Service, AGS Northeast Jaén, Úbeda, Spain

Correspondence should be addressed to César Leal-Costa; cleal@um.es

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Existing studies have identified specific factors influencing some dimensions of evidence-based practice (EBP) competence and use. However, the way these factors interact still needs to be clarified. The purpose of the study was to test a model based on the Determinant Frameworks that explain the relationships and the direct pathways between the characteristics of the nurses, the context, and the implementation strategies and the dimensions of EBP competence, attitude, knowledge, skills, and use of EBP. A cross-sectional study was carried out in Spain during January and February 2020, involving 2,370 nurses employed in public health centers across all autonomous communities within the National Health System. An online survey was administered to gather data, addressing various topics related to the nurses' characteristics, the context in which they worked, the implementation strategy, and their competence in evidence-based practice (EBP). As depicted in the conceptual framework, a structural equation model was constructed to test the hypothesized relationships among key study variables. The model obtained showed a good fit ($\chi^2/df = 3.20$, $p < 0.001$; RMSEA = 0.030 [90% CI 0.025, 0.036]; CFI = 0.989; GFI = 0.990; TLI = 0.983). The context, more specifically, the dimensions of nurse participation in the center's affairs, nursing foundations for quality of care, nurse manager ability leadership and support of nurses, and implementation strategy have a direct and positive effect on EBP use. Training in EBP, reading scientific articles, and having a doctorate are associated with higher competence and knowledge in EBP. The final fit shows the #Evidencer model for the use of EBP (#EvidencerMUSEBP) with two main components: the contextual and strategic factors that influence the implementation of EBP and the characteristics of the professionals, such as their training and reading of articles, which have an impact on EBP competence. This model could guide healthcare organizations in proposing comprehensive interventions to improve EBP use and the competency of nurses.

1. Introduction

The competency of health professionals in evidence-based practice (EBP) plays a fundamental role in adopting and implementing EBP in clinical settings [1]. Recent research has shown, in general terms, a lack of EBP competency in nurses in many countries and practice settings [2–4]. EBP competency comprises four dimensions: attitudes, knowledge, skills, and use of EBP, which can reach different levels of progress in professionals [5]. The literature on the subject

shows that health professionals, including nurses, have positive attitudes and beliefs about the importance and value of EBP for improving the care of patients and moderate levels of their EBP knowledge and skills. However, an adequate level in these dimensions does not necessarily result in changes in behavior, as the use of EBP in daily practice is generally low in all disciplines [6].

Nurses' EBP competency is intricately linked to individual characteristics, the work environment, and implementation strategies. Examining this relationship provides

a more comprehensive understanding of how various factors influence the adoption and application of EBP.

First, professional characteristics, such as age and educational level, are positively associated with EBP competence. Research suggests that younger nurses and those with higher education levels exhibit stronger competence in EBP [3, 7]. More specifically, a Master's degree is associated with enhanced EBP knowledge and use [8]. In addition, specific EBP training has been associated with positive beliefs about EBP [8], and having experience in research has been associated with EBP knowledge and skills [9]. The clinical competency and professional values of nurses, as well as their role as mentors for nursing students, are key drivers of competence in this area [10, 11].

Second, the work context plays a crucial role. Organizational factors, such as the availability of resources and institutional support, have been shown to influence EBP competence [9]. Specifically, active participation in the center's affairs and leadership roles has significantly influenced EBP competence [12]. Furthermore, access to resources such as the Internet [13] and bibliographical databases [8] contributes to competence in this area. There are factors such as working in a magnet hospital that show contrary results depending on the country. A study conducted in Saudi Arabia led to an association with attitude towards EBP [14]. In contrast, a study conducted in the USA showed a lack of differences in the competencies of nurses, regardless of whether they worked in a magnet hospital or not [3].

Third, implementation strategies play a crucial role in EBP competence. Specific EBP training and the presence of specialized mentors have been associated with positive beliefs and increased knowledge of EBP [8]. Moreover, research has demonstrated that mentorship and an organizational culture supportive of EBP positively impact professionals' competence in EBP [10, 11].

As highlighted, research should test models to determine which variables have the most influence on EBP [3]. Existing studies have identified specific factors that could influence some of the dimensions of EBP competence. However, the underlying mechanisms of these relationships and how these factors interact between them still need to be clarified. Up to the present, two studies have been conducted with nursing professionals who tried to develop an explanatory model about the factors associated with competence and implementation of EBP. The first of these was conducted in the USA and was based on the ARCC© Model. The results showed that EBP culture and mentorships were key variables that directly affected the knowledge, beliefs, competence, implementation, work satisfaction, and retention of nurses [15]. On the other hand, the second study, conducted in Saudi Arabia, used a conceptual framework developed from published background works [16]. The skills and beliefs about EBP were the main factors related to their use and were also mediated by factors such as the EBP training of the nurses. The facilitators and barriers also had a significant impact on the application of the EBP [16]. However, these results have a limited generalization to other cultural settings. Cultural factors influence EBP adoption in healthcare

professionals by shaping attitudes toward authority, communication styles, beliefs about health, and the emphasis on collectivism or individualism. Addressing cultural nuances is crucial for tailoring effective implementation strategies. Besides, there are variables that were not found in either model that could be interesting to consider.

Among the theories and conceptual frameworks developed to explain factors that influence the implementation of EBP, the Determinant Frameworks [17] present elements that are adequate for the establishment of an initial conceptual framework that allows testing the influence of certain factors on the competency and use of EBP by nurses. In general terms, these frameworks include five types of determinants: implementation object, characteristics of the professionals, end users, context, and strategy for facilitating the implementation and recognize, based on a systemic approach, the existence of relationships within and between the different levels, although the relationships between these determinants still need to be clarified [18].

In 2020, we conducted a national study in Spain with nurses, in which many variables that monitored three of the determinants mentioned in that model were measured. Specifically, these were the characteristics of the professionals, the context, and the strategy for facilitating the implementation [4]. Beginning with the initial conceptual framework proposed [17], the starting hypothesis to be tested was the existence of a positive relationship between the characteristics of the professionals, the context, and the strategy for facilitating the implementation with EBP competence and, at the same time, with the dimensions that shape it (Figure 1). The great heterogeneity between the studies investigating the factors and determinants of the competence and use of EBP does not allow us to be more specific a priori. Therefore, the purpose of the present study was to develop and test a model supported by the Determinant Frameworks that could explain the relationships and the direct pathways between the nurses' characteristics, the context, and the strategies of implementation, with the dimensions of the EBP competence, attitude, knowledge, skills, and use of EBP.

2. Materials and Methods

2.1. Design. The EBP competence of nurses was evaluated with the data from an observational, cross-sectional, and national study conducted in Spain between January and February 2020 [4]. This timeframe offers a unique insight into the EBP competence of nurses in a pre-pandemic context. At the same time, this study design allows for the simultaneous collection of data at a single point in time, offering a snapshot of the relationships and variables of interest in a same country.

2.2. Participants and Setting. The study included nurses who worked at public health centers from the National Health System in all the autonomous communities in Spain. The following were the selection criteria: nurses currently employed at public health centers affiliated with the NHS,

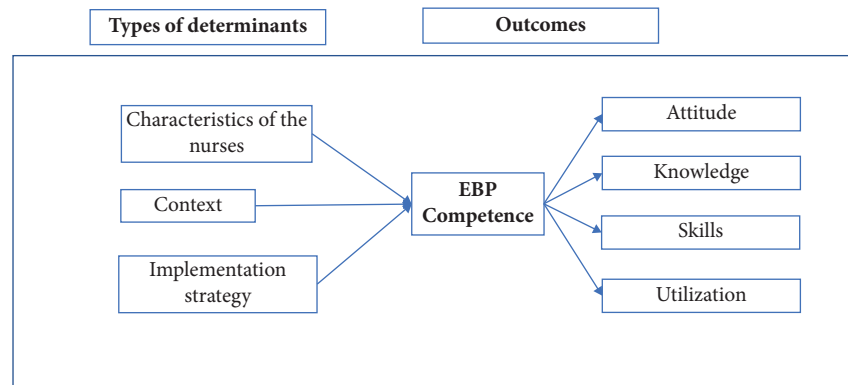


FIGURE 1: Conceptual model. The relationship between types of determinants and EBP competence.

with at least one year of work experience, and working either at a hospital or primary care center with any type of contract.

Data were collected through an online survey using a collaborative national campaign named #Evidencer. The sampling was nonprobabilistic, with voluntary participation among professionals who chose to engage after receiving the invitation. The campaign extended invitations to nurses nationwide via social media, professional associations, trade unions, and scientific organizations to enhance representation.

2.3. Variables and Instruments. The online survey included questions about the characteristics of the nurses, context, strategy for facilitating the implementation, and EBP competence.

2.4. Characteristics of the Nurses. The sociodemographic and professional variables of the nurses included were age, sex, time since completing the Nursing degree, professional experience, level of education that includes bachelor, specialist nurse (refers to formal and officially recognized training that equips professionals with specific clinical competencies in various areas such as obstetrics, community health, and pediatrics), master's degree, and doctorate degree, training on EBP, number of articles read in the last month, nursing students' mentor, and use of the Internet and other digital tools to access scientific information.

2.5. Context. To analyze the organizational context of clinical practice, the Spain-validated version of the questionnaire Practice Environment Scale of the Nursing Work Index (PES-NWI) was utilized to measure the context of nursing practice in health organizations. This instrument has been validated in Spanish in the hospital and primary care contexts [19, 20]. Both versions are similar with the same number of items and the original five-factor model. The Spanish versions of the questionnaire demonstrate robust psychometric properties, including validity and reliability. As outlined in these articles, the validation process underscores the instrument's capacity to effectively measure the nursing work environment in the Spanish context of community and hospital. In order to ensure accuracy, we

used a neutral version of the items or employed two terms where necessary, to accommodate nurses from both contexts. The questionnaire contained 31 items organized into five factors: factor 1 includes nurse participation in the center's affairs (9 items); factor 2 includes nursing foundations of quality of care (10 items); factor 3 includes nurse manager ability, leadership, and support (5 items); factor 4 includes staffing and resource adequacy (4 items); and factor 5 includes nurse-physician relations (3 items). The items were scored with a Likert scale with four response options (from "strongly disagree" to "strongly agree").

In addition to the PES-NWI, we looked at other factors related to the work environment, such as employment status, type of contract, work location, context of care (hospital or primary care), and access to the Internet while at work.

2.6. Strategy for Facilitating the Implementation. This determinant was evaluated by asking the nurses if they worked at a center that was part of the "Best Practice Spotlight Organization (BPSO®) implementation program." These are healthcare centers that participate in the international Registered Nurse' Association of Ontario (RNAO) program for the implementation of Clinical Practice Guidelines (CPGs). This program has been implemented in Spain since 2012, and centers are selected through a competitive process; the centers present the proposals for implementing and evaluating the RNAO CPG in 3 years. The implementation methodology followed in all centers is an adaptation of the knowledge to action model, which includes the following phases: (a) identify the problem and select the available knowledge; in this case, those provided by the CPG; (b) adapt the recommendations to the local setting; (c) assess the obstacles and the facilitators of the use of knowledge; (d) plan and execute the application; (e) supervise the use of knowledge; (f) evaluate the results to determine the success of the application; and (g) develop sustainability strategies [21].

2.7. EBP Competence. To assess the EBP competence, the "Evidence-Based Practice Competency Questionnaire, Professional version (EBP-COQ-Prof®)" was utilized. This tool was validated in Spanish, with adequate validity and

reliability. It allows measuring the self-perceived EBP competence of nurses [5]. Cronbach's α for each scale dimension was 0.888, indicating good internal consistency. A final model was tested with four oblique factors and 35 items. The model fit indices were $\chi^2 = 1,935.92$ ($df = 554$; $p < 0.001$), $\chi^2/df = 3.49$, CFI = 0.932, TLI = 0.927, and RMSEA = 0.093 (90% CI = 0.097–0.108). Factors I is attitude (8 items, range 8–40); factor II is knowledge (11 items, range 11–55); factor III is skills (6 items, range 6–30); and factor IV is utilization (10 items, range 10–50). The items are scored using a Likert scale from 1 to 5 (from “strongly disagree” to “strongly agree”). The overall score for evidence-based practice (EBP) competence ranges from 35 to 175 points, with a higher score indicating greater competence.

2.8. Analysis of Data. Data analysis was performed using the SPSS statistical package version 22.0 and AMOS version 20 (IBM Inc., 2013, NYC). Descriptive statistics were calculated to describe the participants' background characteristics (e.g., basic demographic variables and work-related variables) and key study variables (i.e., EBP competence, context, and strategies for facilitating the implementation of PBE programs). We further examined if any background characteristics were associated with key study variables using one-way ANOVA (for the EBP competence). Pearson's correlation coefficients were also calculated to examine the associations between key study variables.

A structural equation model (SEM) was constructed to test the hypothesized relationships among key study variables as depicted in the conceptual framework (Figure 1). The variables showed adequate normality for the maximum likelihood estimation (MLE) method, i.e., skewness $>2-3$ and kurtosis $>7-10$ [22]. The significance of the regression coefficients was evaluated after estimating the parameters. The effects with $p \leq 0.05$ were considered significant. The fit of the model was evaluated using $\chi^2/df < 5$, the root mean square error of approximation (RMSEA) values ≤ 0.08 , and the comparative fit (CFI), goodness of fit (GFI), and Tucker-Lewis index (TLI) values ≥ 0.90 indicate a good fit [23].

2.9. Ethical Considerations. The study was approved by the Ethics Committee of the University of Murcia (ID: 2540/2019). The nurses were invited to participate voluntarily through an online survey. They were informed about the study's objectives, making it clear that their participation was completely anonymous and that they provided their consent to participate by sending it.

3. Results

The nurses who completed the survey ($n = 2370$) had a mean age of 41.3 (SD = 9.8), a high percentage were women (79.80%), slightly more than half had a Master's degree (55.6%), and about 30% worked in an organization that was implementing the BPSO® program. The remaining socio-demographic variables are shown in Table 1.

TABLE 1: Sociodemographic and professional variables of the sample ($N = 2370$).

	M	SD
Age (years)	41.3	9.8
Time since completing the nursing degree (years)	19.4	10.0
Professional experience (years)	17.6	10.1
	n	%
Sex		
Male	478	20.2
Female	1892	79.8
Educational level		
Bachelor	945	39.9
Master	1004	42.4
Clinical nurse specialist	245	10.3
Doctoral	176	7.4
Employment status		
Eventual	529	22.3
Interim	562	23.7
Permanent	1279	54.0
Type of contract		
Full time	2141	90.3
Part-time	229	9.7
Work setting		
Urban (>50,000 inhabitants)	1620	68.4
Suburban (between 10,000 and 50,000 inhabitants)	541	22.8
Rural (<10,000 inhabitants)	209	8.8
Context of care		
Hospital	1660	70.0
Primary care	710	30.0
Training on EBP n (%)		
None	350	14.8
<40 hours	582	24.6
40–150 hours	694	29.3
>150 hours	744	31.4
Number of articles read in the last month		
0	384	16.2
1 to 3	1013	42.7
>3	973	41.1
Working at a BPSO® center		
Yes	635	26.8
No	1735	73.2
Nursing students' mentor		
Yes	1163	49.1
No	1207	50.9
Use of the Internet and other digital tools to access scientific information		
Yes	1966	83.0
No	404	17.0
Access to the Internet at work		
Yes	2144	90.5
No	226	9.5
Place where accessing the Internet most frequently to consult information		
Home	1855	78.3
Work	515	21.7

M: mean; SD: standard deviation.

With respect to the bivariate results, the categorical variables that were observed to have a statistically significant relationship with the dimensions from EBP competence are shown in Table 2. Relationships were observed between almost all dimensions from the EBP-COQ Prof ©

TABLE 2: Comparison of the sociodemographic and professional variables with the dimensions and total EBP-COQ-Prof©.

	N	EBP attitude				EBP knowledge				EBP skills				EBP utilization				EBP total		
		M	SD	P value		M	SD	P value		M	SD	P value		M	SD	P value		M	SD	P value
Male	478	4.65	0.39	0.154	3.68	0.80	<0.001		3.99	0.56	<0.001		3.31	0.64	0.619		3.85	0.48	<0.001	
Female	1892	4.68	0.37		3.46	0.81			3.86	0.64			3.29	0.63			3.76	0.48		
<i>Educational level</i>																				
(1) Bachelor	945	4.64 ²⁻³⁻⁴	0.39		3.77 ²⁻³⁻⁴	0.78			3.75 ²⁻³⁻⁴	0.55			3.22 ²⁻⁴	0.60			3.62 ²⁻³⁻⁴	0.46		
(2) Master	1004	4.69 ¹	0.36	0.004	3.62 ¹⁻³⁻⁴	0.76	<0.001		3.93 ¹⁻⁴	0.57	<0.001		3.32 ²⁻³⁻⁴	0.65	<0.001		3.83 ¹⁻⁴	0.46	<0.001	
(3) SN	245	4.69 ¹	0.39		3.77 ¹⁻²⁻⁴	0.66			3.97 ¹⁻⁴	0.49			3.34 ¹	0.61			3.89 ¹⁻⁴	0.42		
(4) PhD	176	4.73 ¹	0.38		4.30 ¹⁻²⁻³	0.55			4.25 ¹⁻²⁻³	0.48			3.45 ¹	0.65			4.15 ¹⁻²⁻³	0.40		
<i>Training on EBP</i>																				
(1) None	350	4.58 ²⁻³⁻⁴	0.47		2.86 ²⁻³⁻⁴	0.76			3.63 ²⁻³⁻⁴	0.59			3.00 ²⁻³⁻⁴	0.60			3.43 ²⁻³⁻⁴	0.45		
(2) <40 hours	582	4.66 ¹⁻⁴	0.37	<0.001	3.21 ¹⁻³⁻⁴	0.73	<0.001		3.75 ¹⁻³⁻⁴	0.53	<0.001		3.19 ¹⁻³⁻⁴	0.60	<0.001		3.63 ¹⁻³⁻⁴	0.45	<0.001	
(3) 40-150 hours	694	4.68 ¹⁻⁴	0.37		3.58 ¹⁻²⁻⁴	0.69			3.88 ¹⁻²⁻⁴	0.54			3.34 ¹⁻²⁻⁴	0.61			3.81 ¹⁻²⁻⁴	0.43		
(4) >150 hours	744	4.73 ²⁻³⁻⁴	0.32		3.96 ¹⁻²⁻³	0.70			4.12 ¹⁻²⁻³	0.52			3.47 ¹⁻²⁻³	0.62			4.02 ²⁻³⁻⁴	0.42		
<i>Number of articles read in the last month</i>																				
(1) 0	384	4.49 ³	0.54		2.81 ²⁻³	0.78			3.47 ²⁻³	0.60			2.94 ²⁻³	0.61			3.35 ²⁻³	0.46		
(2) 1 to 3	1013	4.68 ¹⁻³	0.32	<0.001	3.39 ¹⁻³	0.71	<0.001		3.85 ¹⁻³	0.51	<0.001		3.27 ¹⁻³	0.59	<0.001		3.73 ¹⁻³	0.41	<0.001	
(3) >3	973	4.74 ¹⁻²	0.32		3.89 ¹⁻²	0.70			4.08 ¹⁻²	0.51			3.45 ¹⁻²	0.63			3.99 ¹⁻²	0.42		
<i>Use of digital tools to access scientific information</i>																				
Yes	1966	4.65	0.38	0.215	3.53	0.79	0.003		3.90	0.56	0.005		3.30	0.62	0.041		3.79	0.46	0.002	
No	404	4.68	0.37		3.39	0.91			3.81	0.59			3.23	0.68			3.71	0.53		
<i>Access to the Internet at work</i>																				
Yes	2144	4.67	0.38	0.820	3.51	0.81	0.458		3.89	0.57	0.600		3.31	0.64	0.002		3.78	0.48	0.099	
No	226	4.68	0.32		3.46	0.79			3.87	0.50			3.17	0.58			3.73	0.43		
<i>Nursing student mentor</i>																				
Yes	1163	4.68	0.39	0.385	3.58	0.82	<0.001		3.97	0.56	<0.001		3.36	0.65	<0.001		3.83	0.49	<0.001	
No	1207	4.67	0.37		3.43	0.80			3.81	0.56			3.23	0.61			3.72	0.46		
<i>Working in a BPSO® center</i>																				
Yes	635	4.68	0.36	0.833	3.55	0.83	0.102		3.94	0.54	0.008		3.51	0.60	<0.001		3.86	0.45	<0.001	
No	1735	4.67	0.38		3.49	0.77			3.87	0.57			3.21	0.63	<0.001		3.74	0.48	<0.001	

SN: specialist nurse; M: mean; SD: standard deviation; ^{1,2,3,4,5}the category of nurses with which it has statistically significant differences ($p < 0.000$) in the pairwise analysis of the Games-Howell post hoc comparison test.

questionnaire with level of education, EBP training, reading scientific articles, and being a nursing student mentor. Also, sex, use of social networks, having internet access at work, and working in a BPSO® center were associated with the utilization dimension and total competency.

Significant correlations were also observed between the quantitative sociodemographic variables, the dimensions from the PES-NWI, and the dimensions from the EBP-COQ Prof© questionnaire (Table 3). Age, the time since completing the nursing degree, and work experience showed significant and inverse bivariate correlations with attitude, knowledge, total EBP competence, and the dimension from the PES-NWI collegial nurse/physician relation, while positive correlations were obtained with nurse participation in the center's affairs and nursing foundations for quality of care. The dimensions from the PES-NWI showed correlations with the dimensions from the EBP-COQ that oscillated between 0.020 and 0.094 with attitude, between 0.055 and 0.151 with knowledge, and between 0.134 and 0.217 with skills. The dimension use of EBP showed the strongest correlations, with all the dimensions from the PES-NWI obtaining values between 0.306 and 0.535.

3.1. Structural Equation Modeling

3.1.1. Testing the Initial Hypothesized Model. The preliminarily hypothesized model (Figure 2) showed a poor fit ($\chi^2/df = 16.62$, $p < 0.001$; RMSEA = 0.081 (IC del 90% 0.077, 0.085); CFI = 0.885; GFI = 0.938; TLI = 0.837). After evaluating modification indices and parameter estimates, numerous paths were nonsignificant; subsequently, they were removed to make the measurement model more theoretically parsimonious.

3.1.2. Testing the Modified Model. The influencing factors on EBP competence were specified (Figure 3 and Table 4). The modified model showed a good fit ($\chi^2/df = 3.20$, $p < 0.001$; RMSEA = 0.030 (90% CI 0.025, 0.036); CFI = 0.989; GFI = 0.990; TLI = 0.983). Explicitly, EBP competence was significantly influenced by work context ($\beta = 0.26$, $p < 0.001$), level of education (Doctorate) ($\beta = 0.07$, $p < 0.001$), EBP training >150 hours ($\beta = 0.23$, $p < 0.001$), and read >3 articles ($\beta = 0.26$, $p < 0.001$). The study findings show that work in a BPSO® center had an indirect effect on EBP competence. In total, the factors explained 25% of the variance on EBP competence.

The knowledge dimension of EBP competence was significantly influenced by level of education (Doctorate) ($\beta = 0.13$, $p < 0.001$), EBP training >150 hours ($\beta = 0.11$, $p < 0.001$), and read >3 articles ($\beta = 0.11$, $p < 0.001$). In addition, the abovementioned variables, work in a BPSO® center and the work context, had an indirect effect on the knowledge dimension of EBP competence. In total, the factors explained 61% of the variance on knowledge dimension.

Finally, the utilization dimension of EBP competence was significantly influenced by Nurse Participation in the center's affairs ($\beta = 0.10$, $p < 0.001$), Nursing Foundations for

Quality of Care ($\beta = 0.26$, $p < 0.001$), Nurse Manager Ability Leadership and Support of Nurses ($\beta = 0.10$, $p < 0.001$), and work in a BPSO® Center ($\beta = 0.10$, $p < 0.001$). Furthermore, work in a BPSO® center, work context, level of education (Doctorate), EBP training >150 hours, and reading > 3 articles had an indirect effect on the utilization dimension of EBP competence. The factors explained 59% of the variance in the knowledge dimension (Table 4).

4. Discussion

Following the Determinant Framework [17], our study presents the first empirical model that tested the relationship of certain variables associated with the characteristics of the professionals, the context, and the implementation strategies with EBP competence and utilization of a national sample of nurses in Spain whose sociodemographic and professional characteristics aligned with those of Spanish nurses employed in public health centers [24]. The final fit shows a model mainly linked to the utilization of EBP by clinical nurses. This model will be referred to as the #Evidencer model for the use of EBP (#EvidencerMUSEBP).

The #EvidencerMUSEBP model consists of two main components. The first component is related to the utilization of evidence-based practice (EBP), which includes determinants associated with the context and implementation strategy. The second component is related to the characteristics of professionals, such as their training and reading of articles. This component is directly linked to EBP competence, knowledge, and skills. The #EvidencerMUSEBP model suggests that although professionals may possess sufficient knowledge and skills in EBP, it may translate into something other than an equivalent use of EBP. This is consistent with findings from many studies [6]. It can also explain why interventions that solely focus on training professionals only improve their knowledge and skills without significantly impacting the use of EBP [25, 26]. Without a doubt, the model is complex and requires a systematic strategy that can synchronously and cohesively influence different factors to improve the use of EBP. This conclusion aligns with the findings of a recent review on the implementation of change in nursing practice [27].

In our study, we found that the determinants "context" and "implementation strategy" accounted for 59% of the variation in the utilization of evidence-based practice (EBP). This indicates a considerable effect size. We use the Practice Environment Scale of the Nursing Work Index (PES-NWI) to evaluate the clinical environment, a reliable tool widely used to assess nursing practice environments across multiple countries [28]. Also, this instrument includes the most common dimensions of the context described in the determinant frameworks widely used in evidence science; the majority of the frameworks outlined contextual determinants that could be ascribed to organizational support, financial resources, and social relations and support, as well as leadership, organizational culture, and climate [29]. Our findings showed that the overall score in the practice environment was directly related to EBP competence, which aligns with previous studies [12]. In addition, we discovered

TABLE 3: Relationships among sociodemographic variables, PES-NWI dimensions, and EBP-COQ Prof © dimensions.

	Years end of studies	Professional experience	Nurse participation in center's affairs	Nursing foundations for quality of care	Nurse manager ability and nurse support	Staffing and resources adequacy	Collegial nurse/physician relationship	PES-NWI total	EBP attitude	EBP knowledge	EBP skills	EBP utilization	EBP competence
Age	<i>r</i> 0.924 <i>P</i> <0.001 value	0.921 <0.001	0.111 <0.001	0.068 0.001	0.031 0.134	0.037 0.074	-0.048 0.020	0.070 0.001	-0.077 <0.001	-0.093 <0.001	-0.032 0.118	0.039 0.058	-0.055 0.008
Years end of studies	<i>r</i> 1 <i>P</i> <0.001 value	0.974 <0.001	0.110 <0.001	0.074 <0.001	0.024 0.249	0.042 0.043	-0.051 0.014	0.070 0.001	-0.079 <0.001	-0.086 <0.001	-0.026 0.204	0.042 0.042	-0.049 0.017
Professional experience	<i>r</i> 1 <i>P</i> <0.001 value	1	0.115 <0.001	0.076 <0.001	0.021 0.309	0.047 0.021	-0.046 0.024	0.073 <0.001	-0.077 <0.001	-0.070 0.001	-0.007 0.742	0.048 0.020	-0.035 0.093
Nurse participation in center's affairs	<i>r</i> 1 <i>P</i> <0.001 value	1	0.763 <0.001	0.763 <0.001	0.654 <0.001	0.537 <0.001	0.501 <0.001	0.914 <0.001	0.094 <0.001	0.151 <0.001	0.200 <0.001	0.503 <0.001	0.327 <0.001
Nursing foundations for quality of care	<i>r</i> 1 <i>P</i> <0.001 value	1	0.609 <0.001	1	0.609 <0.001	0.490 <0.001	0.499 <0.001	0.896 <0.001	0.083 <0.001	0.133 <0.001	0.210 <0.001	0.535 <0.001	0.330 <0.001
Nurse manager ability, leadership and nurse support	<i>r</i> 1 <i>P</i> <0.001 value	1	0.413 <0.001	0.425 <0.001	1	0.413 <0.001	0.425 <0.001	0.791 <0.001	0.075 <0.001	0.062 0.003	0.134 <0.001	0.417 <0.001	0.231 <0.001
Staffing and resource adequacy	<i>r</i> 1 <i>P</i> <0.001 value	1	1	0.418 <0.001	1	1	0.418 <0.001	0.667 <0.001	0.066 0.001	0.111 <0.001	0.157 <0.001	0.306 <0.001	0.218 <0.001
Collegial nurse/physician relationship	<i>r</i> 1 <i>P</i> <0.001 value	1	0.637 <0.001	0.637 <0.001	1	0.637 <0.001	1	0.637 <0.001	0.048 0.020	0.055 0.007	0.145 <0.001	0.307 <0.001	0.183 <0.001
PES-NWI total	<i>r</i> 1 <i>P</i> <0.001 value	1	0.096 <0.001	0.096 <0.001	1	0.096 <0.001	1	0.096 <0.001	0.096 <0.001	0.138 <0.001	0.217 <0.001	0.546 <0.001	0.340 <0.001
EBP attitude	<i>r</i> 1 <i>P</i> <0.001 value	1	0.243 <0.001	0.243 <0.001	1	0.243 <0.001	1	0.243 <0.001	0.294 <0.001	0.243 <0.001	0.294 <0.001	0.246 <0.001	0.461 <0.001
EBP knowledge	<i>r</i> 1 <i>P</i> <0.001 value	1	0.631 <0.001	0.631 <0.001	1	0.631 <0.001	1	0.631 <0.001	0.631 <0.001	1	0.631 <0.001	0.461 <0.001	0.876 <0.001
EBP skills	<i>r</i> 1 <i>P</i> <0.001 value	1	0.529 <0.001	0.529 <0.001	1	0.529 <0.001	1	0.529 <0.001	0.529 <0.001	1	0.529 <0.001	0.790 <0.001	0.790 <0.001
EBP utilization	<i>r</i> 1 <i>P</i> <0.001 value	1	0.773 <0.001	0.773 <0.001	1	0.773 <0.001	1	0.773 <0.001	0.773 <0.001	1	0.773 <0.001	0.773 <0.001	0.773 <0.001

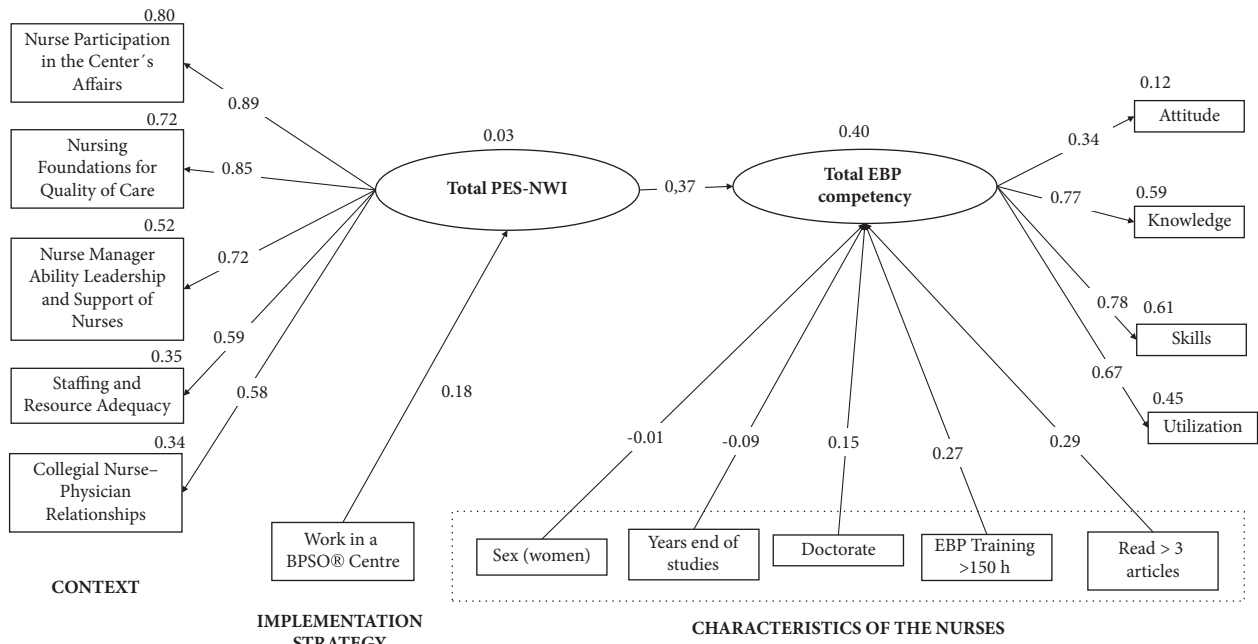


FIGURE 2: Initial model with standardized parameter estimates.

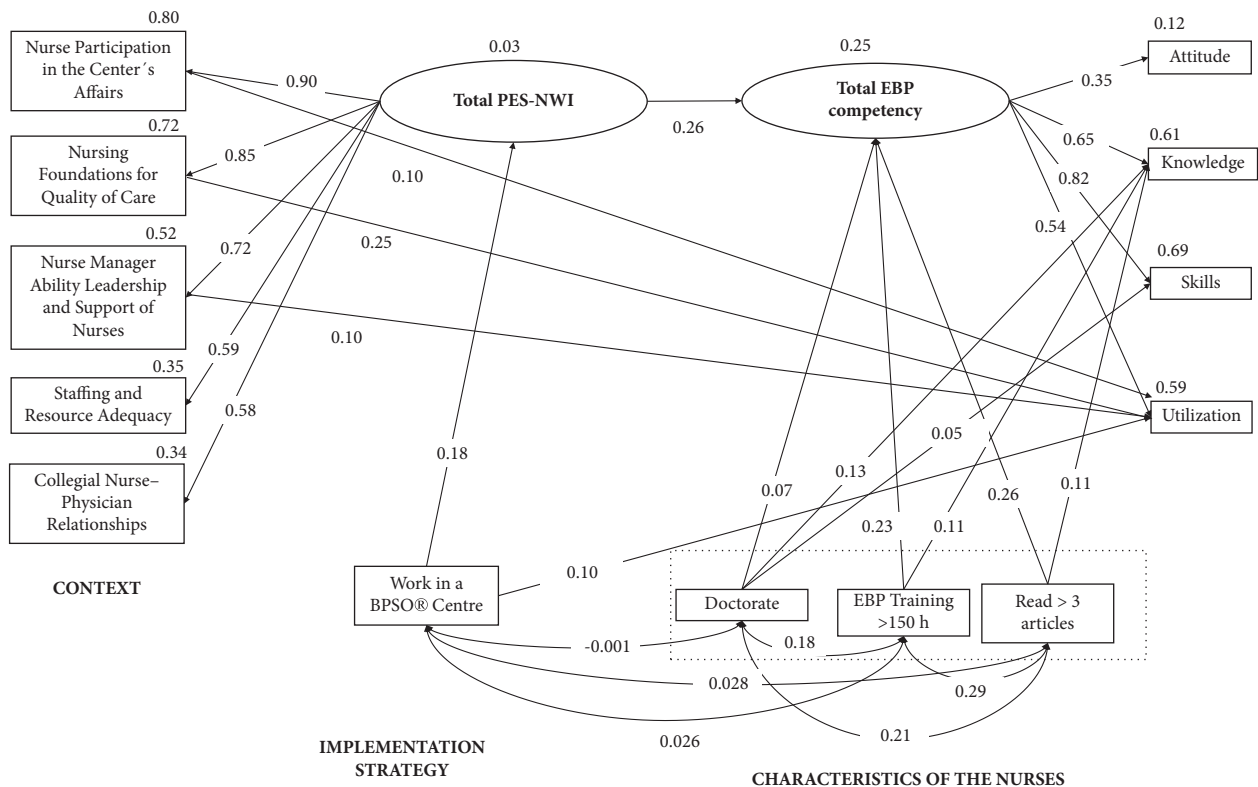


FIGURE 3: Modified model with standardized parameter estimates: #EvidencerMUSEBP model.

that the dimensions of nurse participation in the center's affairs, nursing foundations for quality of care, and nurse manager ability leadership and support of nurses have a positive, direct effect, more specifically on the utilization of

EBP. This means that promoting the participation of nurses in the institution's internal governing body, political and committee decisions, providing them with promotion opportunities, having good nursing managers and leaders, and

TABLE 4: Summary of the total, direct, and indirect effects of variables in the model.

Outcome variables	Independent variables	β	Standardized effects		Squared multiple correlations
			Direct effect	Indirect effect	
Total EBP competence	Work context (total PES-NWI)	0.667	0.26**	0	0.26**
	Education level (doctorate)	0.282	0.07*	0	0.07*
	EBP training >150 h	0.541	0.23**	0	0.23**
	Read >3 articles	0.570	0.26**	0	0.26**
	Work in a PBSO® center	0.111	0	0.046	0.046
Knowledge dimension of EBP competence	Education level (doctorate)	6.089	0.13**	0.045	0.178**
	EBP training >150 h	5.087	0.11**	0.152	0.264**
	Read >3 articles	5.090	0.11**	0.170	0.279**
	Work in a PBSO® center	0.603	0	0.030	0.030
	Work context (total PES-NWI)	3.629	0	0.168	0.168**
Utilization dimension of EBP competence	Work in a PBSO® center	1.470	0.102**	0.091	0.194**
	PES-NWI dimension nurse participation in center's affairs	3.169	0.099**	0	0.099**
	PES-NWI dimension nursing foundations for quality of care	2.673	0.253**	0	0.253**
	PES-NWI dimension nurse manager ability leadership and support of nurses	0.815	0.102**	0	0.102**
	Education level (doctorate)	0.893	0	0.037	0.037
	EBP training >150 h	1.716	0	0.125	0.125
	Read >3 articles	1.806	0	0.140	0.140**
	Work context (total PES-NWI)	7.885	0	0.516	0.516**

* $p < 0.05$, ** $p < 0.001$.

institutions having a nursing philosophy directly influence the use of EBP in clinical practice. Our findings are consistent with other recent studies [30–33].

Regarding the dimensions evaluated in the context, it is surprising that the dimension of staffing and resource adequacy, commonly viewed as a barrier against the use of research in clinical practice [34, 35], did not influence the use of EBP. This finding is consistent with previous studies [36]. Experts have pointed out that resource and personnel availability may be favorable for applying EBP, but they must be accompanied by leadership, promotion opportunities, and participation in the institution for EBP use to be effective [29]. This idea emphasizes the fact that we are dealing with a complex model, and a systemic strategy that can influence the different factors in a synchronous and coordinated manner is needed to address it.

Concerning the determinant of “strategy for facilitating implementation,” which is defined as the methods or techniques utilized to improve the adoption, application, and sustainability of a program or clinical practice [37], it has been assessed through the implementation program of clinical practice guidelines named BPSO® of the RNAO. The model showed a positive and direct relation between participation in this program and the use of EBP. This strategy involves the institution in both the implementation and development of Clinical Practice Guidelines (CPGs). It requires the support of executive directors and nurse managers at healthcare centers, promoting teamwork and a culture of change. These aspects are deemed fundamental for successfully implementing evidence-based practices [38]. In line with our results, applying the BPSO® program has shown favorable results in using EBP in clinical practice in health centers in Spain [39, 40] and other countries [41, 42]. These findings, consistent with previous studies, provide new empirical evidence supporting the link between organizational support for innovation and the adoption of innovative practices [43].

The #EvidencerMUSEBP model also suggests that the implementation strategy indirectly affects EBP competence and knowledge, mediated by the practice environment, suggesting that the strategy to facilitate the implementation of evidence also positively influences these two aspects at a secondary level. Empirical evidence has demonstrated that training professionals on aspects related to the culture of change and EBP knowledge included in the BPSO® program leads to improvements in EBP competence and knowledge [44]. These results confirm that the successful application of the EBP strategy tends to require a process of active change directed towards the use of the intervention by individuals and the organization [45] to achieve a change in the practice environment that, at the same time, influences the competence of professionals.

Concerning the determinant characteristics of the nursing professionals related to the training and direct contact with scientific updating and the overall score of the PES-NWI (context), the determinants showed a direct relationship with EBP competence, explaining 25% of the variance. In addition, the variables related to the characteristics of the professional (having a doctorate, having more

than 150 hours of EBP training, and reading more than three articles per month), together with the overall score of the PES-NWI mediated by its effect on the general EBP competence, explained 61% of the variance, while having a doctorate also influenced EBP skills, although the relationship was weak. These findings are significant, as negative feelings or a lack of interest in research by nursing professionals have been described [46], so activities that promote the association between research and nursing practice should be promoted starting at the initial levels of nurse training. Also, the final model did not retain variables associated with the sociodemographic characteristics of the professionals, such as gender, age, or years of work experience, which are significant in previous studies [47]. This omission suggests that in the fitting of the final model, these variables did not play a determinant role. Scientifically, these variables may exert limited influence on evidence-based practice (EBP) competence and utilization compared to factors more directly linked to the profession, environment, and implementation strategies. Moreover, their exclusion may contribute to a more parsimonious and specific model, mitigating issues related to multicollinearity and emphasizing determinants more pertinent to the effective adoption of EBP in clinical settings.

The results contribute towards prioritizing the determinants on which health organizations should propose interventions to improve EBP use and competence. The #EvidencerMUSEBP and the associations established between the determinants studied show that it is vital to consider the characteristics of the professionals, the context, and the implementation strategies in a manner that is integrated and nonfragmented, as the successful application of EBP depends on the combinations of different determinants. Adopting an excessively reductionist approach, in which an intervention is conducted in a single variable, will not have the ability to influence the improvement of the use of EBP. Two or more determinants can be combined to create efficient effects and with an amplified effect that acts on nurses' use, knowledge, skills, and EBP competence.

The study's findings have notable implications for nurse managers, emphasizing the need for leadership development to promote evidence-based practices. Nurse managers can play a pivotal role in shaping organizational culture, fostering participation, and strategically engaging in programs like BPSO® for successful EBP implementation. Customized implementation strategies, continuous professional development, and a focus on creating supportive environments are key considerations for nurse managers aiming to enhance EBP competence among their teams.

5. Limitations

It is important to acknowledge certain study limitations that can affect the interpretation of its results. First, the selection of participants relied solely on nurses' willingness, and data collection was done through online surveys. These two factors may have introduced bias in the selection process as the characteristics of the nurses who participated may differ from those who chose not to participate or those who do not

have access to the internet. We could not identify whether the nurses' master's degree was professionalizing or research based. This difference could affect the number of research hours and, consequently, influence the results. Second, conducting a more detailed examination of the potential limitations associated with the positive correlation between participation in the BPSO® program and the use of Evidence-Based Practice (EBP) would be helpful. Future research should focus on exploring contextual factors that may influence the effectiveness of the program, such as differences in organizational structure, nursing contexts like hospital and primary care, varying levels of engagement among participants, or potential challenges in implementing the program. This deeper analysis will provide a more balanced perspective and facilitate a better understanding of the program's real-world applicability and potential areas for improvement.

Furthermore, while the study evaluated multiple variables related to the organizational context, it is essential to note that these variables were based on the perceptions of the participants as proposed by the questionnaire utilized, and this may not have comprehensively captured all the relevant aspects of the work environment that could have influenced EBP competence. For future research, it is recommended to test the #EvidencerMUSEBP separately in hospital and primary care contexts and compare results across different regions. In addition, including additional determinants of the model that were not analyzed in this study, such as the type of evidence and the end users, and to evaluate the impact of these factors in the #EvidencerMUSEBP would provide further insights.

6. Conclusions

The #EvidencerMUSEBP model incorporates characteristics of professionals, context, and implementation strategies, demonstrating a solid fit. This model provides empirical evidence that directly associates the characteristics of the nursing professionals, such as a high level of education, reading articles, and EBP training, with EBP knowledge and skills, thereby indirectly impacting the use of evidence.

On the other hand, the context conceived as the practice environment, which includes a nursing perspective, and is backed by institutional leaders and organizations that promote the feeling of belonging of the professionals, together with strategies such as the implementation of the CPG BPSO® program, exerts a direct influence on EBP adoption. These factors, at the same time, exert an indirect effect on EBP competence and knowledge.

The study emphasizes the vital role of leadership for nurse managers in promoting evidence-based practices, highlighting the need for customized strategies and continuous professional development to enhance competence within healthcare teams. A key aspect is that healthcare services managers and providers must internalize the need to jointly address these elements, recognizing that improvement in EBP requires comprehensive, synchronous, and coordinated actions on all fronts.

Data Availability

The data used to support the study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this paper.

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Supplementary Materials

Estimates, covariance matrix, and correlation matrix of the study's initial and final models. (*Supplementary Materials*)

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Research Article

Determinants of First-Line Nurse Managers' Span of Control: A Delphi Study

Ángel Boned-Galán ^{1,2} Nieves López-Ibort ^{2,3} Ana I. Gil-Lacruz ^{2,4}
and Ana Gascón-Catalán ^{2,5}

¹Sterilization Center, Miguel Servet University Hospital, Zaragoza, Spain

²Aragon Health Research Institute (IIS Aragon), Zaragoza, Spain

³Home Dialysis Unit, Lozano Blesa University Clinical Hospital, Zaragoza, Spain

⁴Department of Business Management and Organization, School of Engineering and Architecture, University of Zaragoza, Zaragoza, Spain

⁵Department of Psychiatry and Nursing, Faculty of Health Sciences, University of Zaragoza, Zaragoza, Spain

Correspondence should be addressed to Ana Gascón-Catalán; agascon@unizar.es

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Aims: The main goal of this research is to identify, through expert consensus, the key factors that determine the span of control (SOC) of first-line nurse managers (FLNMs) in the Spanish healthcare system.

Background: The SOC is a management concept which has usually been defined as the number of subordinates reporting to a superior. In nursing, however, it is much more complex. This complexity is shaped by various factors related to patients, healthcare professionals and organisational structures. Nursing leaders must thoroughly consider these factors and their determinants, which necessitate a comprehensive assessment. Given the significant impact an inadequate SOC can have on patients, professionals and the organisation, it would be beneficial to address this issue. In nursing, studies on this subject are practically nonexistent and focus solely on the number of subordinates, highlighting the need for research in this area.

Methods: Between September and December 2022, a Delphi study was conducted. Forty-five experts were invited to participate. The study involved nurse administrators, FLNMs, university professors, renowned researchers and other non-health professionals related to health management. The participants completed an online survey over three phases. Factor analysis was performed on the items for which consensus was reached. The jamovi software version 2.3.15 was used for data analysis.

Results: A total of 35 experts participated in at least one of the three phases of the Delphi study. Following a comprehensive analysis of the identified factors, a consensus was reached on 31 of them. These were subsequently grouped into four categories: unit category (16 items, including complexity, resource management, conflicts and protocolisation and monitoring of activities), professional category (five items: number of staff, staffing stability and skill level and diversity of staff), FLNM category (four items: autonomy, experience and education and leadership style) and organisation category (six items: digitisation and information systems, education, research and implementation evidence-based practice and performing guards).

Conclusions: Our research shows a high degree of consensus amongst participants in identifying the determinants and degree of relevance of SOC-related aspects. Although SOC is not currently assessed, all stakeholders agree that there are a large number of variables that should be considered when appointing a FLNM.

Implications for Nurse Managers: Nursing managers can better assess the health of the organisation and improve performance by understanding the factors that influence the SOC of FLNMs. Due to the lack of previous studies, understanding these factors will allow the development of methods and tools tailored to the characteristics of different health systems.

Keywords: Delphi method; first-line nurse manager; hospital; management; nursing; span of control

1. Background

Nurse managers play an important role in achieving the goals of healthcare organisations within their respective nursing units and departments [1, 2], especially in aspects relating to leading and coordinating quality improvement work [3]. The nurse manager collective includes first-line nurse managers (FLNMs). This position is defined as individuals who have direct responsibility for patient/resident care units, with nurses and other care providers reporting to them. They are responsible for recruitment and performance management. There is no level of management below them, and they may be responsible for managing more than one unit [4].

One key aspect of the role of FLNMs is human resource management. This is where the concept of span of control (SOC) comes in. SOC originated as a business concept in the 1930s to describe the number of subordinates reporting to a superior [5]. However, the evolution of the term has been nuanced as knowledge of the subject has increased, from the number of full-time equivalent employees [6] to the number of people reporting to a manager [7].

An updated literature review suggests that SOC is a multidimensional phenomenon influenced by a variety of different factors related to the workplace, the unit workers, the FLNM and the organisation [6, 8–12]. Healthcare is becoming complex due to factors such as the need for efficient care, advancements in technology and research, longer life expectancy and the increasing complexity of patient care. In addition, challenges in recruiting and retaining healthcare professionals are contributing to the need for professional practice redesign [13].

SOC theory [14] proposes that there is a size of SOC at which maximum effectiveness is achieved. However, the literature does not offer a specific number or formula for determining the ideal number of direct reports in an optimal SOC [14].

Following this argumentation line, the 2002 Final Report of the Canadian Nursing Advisory Committee encouraged employers to explore and evaluate the characteristics of an appropriate, manageable SOC for clinical managers that allows them to perform assigned functions and be available to meet the needs of nurses and patients [15].

A handful of healthcare-specific studies have examined the impact of SOC on various outcomes: patients (e.g., patient safety and satisfaction) [4, 16, 17], employees (e.g., employee satisfaction, behaviour, turnover and safety) [18–21], FLNM (e.g., influence on leadership, job demands, role, behaviour and skills) [22–24] and organisation (e.g., loss of talent, reputation and organisational outcome) [6, 12, 25].

Only in few health systems, such as the one of Canada [13], a tool has been developed and implemented to determine the SOC of a FLNM. A questionnaire was designed to support objective decision-making on SOC, with a total of eight indicators grouped into three dimensions: staffing, programme and unit characteristics. These dimensions include unit complexity, management of material resources and general services, assigned staff, skills/autonomy (junior

professionals), stability (turnover and absenteeism), staff diversity, programme diversity and managed budget.

It should be borne in mind that the health systems of each country are different and condition the functioning of health organisations, so the particular characteristics of each country should be studied in order to propose the most appropriate tool.

Under this background, the perspective of nurses should be considered to identify the main determinants of the SOC of a FLNM in the Spanish health system. To do this, it is necessary to have the vision and experience of experts at the national level.

Amongst the qualitative research techniques, one of the most appropriate for this purpose is the Delphi method. This is a consensus technique developed by the Research and Development Corporation (RAND Corporation) in the 1950s to obtain expert agreement on various phenomena [26]. The Delphi method is now used on the Internet in a form commonly referred to as e-Delphi, where researchers conduct the Delphi in an online survey platform to collect data and facilitate communication between the researcher and experts [27].

The aim of this study is to identify the main factors determining the SOC of FLNMs in hospitals within the Spanish health system, using the Delphi technique and with the participation of a panel of experts on the subject at the national level.

2. Methods

2.1. Study Design. A three-round Delphi survey (Phases 0, 1 and 2) was implemented, including expert panellists, iterative rounds, statistical analysis and consensus building. The Delphi method was selected to generate ideas from the expert panellists' own knowledge and experience in their different fields of action.

The Delphi method is a technique used to achieve consensus amongst experts from various disciplines on a specific topic [28–31]. Its main strength lies in allowing anonymous interaction amongst experts, who can access the responses of others without knowing their identities or authority on the subject. This enables participants to modify their responses in successive rounds, controlled by a coordinating group, until the responses represent the majority opinion. This study facilitated an anonymous exchange of opinions and expertise, allowing experts to assess and modify their views in line with group consensus, thus promoting a collaborative and informed decision-making process.

The coordinating group consisted of the principal investigator (a nurse with over 24 years of experience in the Spanish public health system, including the last 10 years in diverse management positions) and three experts in management (two specialising in healthcare management and one with a background in business).

The survey was conducted three times via online questionnaires between September and December 2022. LimeSurvey was used as an anonymous online survey tool to send the questionnaires and receive the responses.

2.2. Participants. In order to obtain a model valid for the entire Spanish territory and to avoid possible biases due to the characteristics of the regional health services, it was decided to form a panel of expert's representative of the whole country.

The method proposed by Okoli and Pawloski [28] was used to select the panel of experts: (a) nursing administrators, (b) FLNM and (c) other health professionals, e.g., university professors, renowned researchers or other non-health professionals related to health management. A group of 45 national experts was selected and invited to participate through an e-mail describing the objectives and procedures.

2.3. Data Collection

2.3.1. Generate an Item Pool. In order not to condition the participants' opinions, they were asked to list aspects related to SOC in Phase 0 of the study. Therefore, this step was explored by asking the expert panellists an open-ended question: 'List as many key factors as possible to consider in determining the SOC of a FLNM.' There were 30 separate sections within the questionnaire for this purpose, as well as a final section for any additional comments.

2.3.2. Questionnaire Design. Prior to the consultation, a review of the existing literature on the SOC in nursing was undertaken to gain a better understanding of the topic and to identify possible aspects that had not been mentioned by the expert panel.

We implemented a search strategy to identify the existing work related to nurse manager SOC. We searched Medline, Web of Science and Embase for the literature using the following search terms: nurse administrator, nurse manager, FLNM, nursing supervisor, head nurse, nurse management, charge nurse, SOC, span of management, work group size and nursing.

The recommendations of Dillman et al. were followed for the development of the questionnaire and the periodicity of sending reminders for the online questionnaire [29].

The initial questionnaire produced unstructured, qualitative data which were transcribed verbatim into Word documents. A thematic analysis was carried out to identify recurring themes [30, 31]. The documents were systematically examined to identify related or similar themes as well as dissimilar themes. This stage of the analysis was carried out independently by the researcher and the Delphi study coordination group.

Comparative notes were used to validate the emerging concepts. The themes identified were then used to formulate items for the subsequent second and third rounds of questionnaires. These themes formed a first questionnaire, grouped into different dimensions, to be evaluated by the panel of experts. For this purpose, a five-point Likert scale was used to answer the questions, without distinguishing between positive and negative SOC impacts. The questions related to two dimensions: (a) the degree of relevance of the item to the FLNM management SOC (1 = *not relevant*,

2 = *less relevant*, 3 = *relevant*, 4 = *very relevant* and 5 = *extremely relevant*) and (b) whether such an item should be included in a final SOC assessment tool for an FLNM (yes/no). In addition, a space for comments or questions to the coordination group was included.

In the second and third surveys, the response data were tabulated and presented by the researcher, showing the percentage of choices and the distribution of responses for each item. The panellists' comments were used to reformulate or clarify the wording of the various items.

After each phase, the results and relevant comments were anonymised and provided to the participants in a detailed report sent by e-mail.

2.4. Extraction of Items: Statistical Analysis. In any Delphi-based study, the definition of consensus must be a priority. Therefore, for this research, consensus was defined using two criteria: (i) more than 80% of the participants in the round should indicate 'YES' to the need for the item to be part of a tool to determine the SOC of a FLNM, and furthermore, (ii) the item should be rated with an average of three or more on the five-point scale.

jamovi software Version 2.3.15 was used for data analysis. Mode, median, mean, standard deviation, interquartile range and percentages are presented.

2.5. Ethical Consideration. Questionnaires were distributed to participants via e-mail accompanied by a link to an anonymous online survey tool (LimeSurvey). Individual names of respondents were anonymised.

The purpose and methods of the study were explained to participants at the beginning of the first questionnaire, and they were informed that their cooperation was voluntary and that there would be no disadvantage for nonparticipation.

Participants' rights to autonomy were respected, and informed consent was obtained through written explanations of the benefits, rights and risks associated with the research study. Consent to participate was implied by the return of the questionnaire, which included an explicit checkbox to accept the conditions of the study. Confidentiality was strictly maintained throughout the data collection phase of the study.

The questionnaires were accessible only to the researcher, which ensured the highest level of confidentiality. Participants shared their opinions anonymously; the data collected were collated to represent group perspectives while maintaining individual anonymity. The results were presented in an aggregate form, representing the collective opinion of the members of the expert panel. This study was approved by the Comité de Ética de la Investigación de la Comunidad Autónoma de Aragón: CEICA (C.P.-C.I. PI22/351).

3. Results

The Delphi study was conducted to determine the content/face validity of items that would later be used in the development of a validated assessment instrument.

3.1. Experts. Of the 45 experts invited, 43 accepted the invitation: seven did not participate and one participant decided to leave the study after it had started. The number of participants per phase was 29 in Phase 0, 31 in Phase 1 and 29 in Phase 2. Three phases were completed by 22 participants. Figure 1 shows the date of completion and details of participation in each phase of the Delphi study. All participants' contributions were taken into account, regardless of whether they participated in one, two or all three phases.

3.1.1. Results of Phase 0 of the Study. A total of 29 experts participated in this first phase of the study by answering the following question: 'List the most important factors to consider when determining the SOC of a nurse manager.' The number of responses ranged from a maximum of 29 from one participant to a minimum of five, with a mode = 12 and a median = 11 responses.

The answers ranged from very general to very specific, for example, one of the managers gave the following answer 'The number of professionals who depend on the FLNM', while a FLNM stated the following: 'The large number of professionals in charge (about 45 amongst the four shifts) of the FLNM, including the time dedicated to calculate personal schedules and adequate coverage of the unit.' The total number of items generated in this phase was 29.

3.1.2. Results of Phases 1 and 2 of the Study. The questionnaire for Phase 1 contained 31 items (29 items from panellists and two items from the literature review) and an open-ended question after each section to collect panellists' questions and comments. The questionnaires for Phase 2 consisted of 34 items, including three items created on the basis of comments from the second survey. A descriptive analysis of the results obtained in Phases 1 and 2 is shown in Table 1.

The table illustrates the evolution in the acceptance of the items by the expert panel, expressed as the mean of the degree of relevance of the item to the FLNM management SOC (1 = not relevant and 5 = extremely relevant). The items related to the unit identified by the expert panel and those added by the coordinating group after consultation of the available literature are shown in Table 2. A total of 15 items were identified in Phase 0 of the Delphi study to be evaluated in Phase 1. In the Phase 1 observations, the expert panel included three new items, which were added to be evaluated in Phase 2. Upon review of the expert panel's comments, it became evident that modifications to the wording or the addition of explanatory texts were necessary to facilitate the comprehension of four items (U04, U05, U11 and U12). Finally, a total of 16 items were agreed in the 'unit' category, which were grouped into four indicators: complexity (U02, U03, U05, U07, U09, U12, U13 and U15), resource management (U06, U10 and U16), conflicts (U04 and U11) and protocolisation and monitoring of activities (U01, U08 and U14). The Items U17, 'Interdisciplinary communication and maintenance of care processes and circuits', and U18, 'The presence of a clinical nurse specialist in the unit to support the management and monitoring of processes and projects', were not accepted.

A total of six items related to professionals were identified in Phase 0 of the Delphi study and were evaluated in Phases 1 and 2 (Table 3). Following the completion of Phase 1, it became necessary to elucidate the meaning of Items P01 and P03. In the case of P01, the following text was added: 'It will be necessary to assess the need for job-oriented training of the professional (staff of the unit or service, but also "pool" staff).' The only item that was not retained was Item P06, which pertained to the average age of professionals in the unit. Finally, five items were agreed upon in the 'professionals' category which were grouped into three indicators: the number of staff (P02), staffing stability (P01, P04 and P05) and skill level and diversity of staff (P03).

A total of four items related to FLNMs were identified in Phase 0 of the Delphi study, all of which were evaluated and accepted by the expert panel (Table 4). The category 'FLNM' was grouped into three indicators: autonomy (F02), experience and education (F03 and F04) and leadership style (F01). Prior to commencing Phase 2, it was observed that Item F03 pertained to a range of training modalities, including those pertaining to master's degrees, soft skills, information technology (IT) and other disciplines.

A total of six items related to organisational characteristics were identified in Phase 0 of the Delphi study, all of which were evaluated and accepted by the expert panel (Table 5). It was necessary to modify the wording of Item O02 and add the following explanatory text: This can be related to new professionals but also to new procedures, techniques or new working dynamics. This process involves the planning, implementation and evaluation of improvement actions. It should be noted that this does not necessarily imply that the entire process must be carried out by the FLNM. The 'organisation' category was composed of three indicators: digitisation and information systems (O01), education, research and implementation of evidence-based practice (O02, O03, O04 and O05) and performing guards (O06).

4. Discussion

To the best of our knowledge, this is the first study carried out on this subject in Spain and in Europe, which could provide the basis for the development of a tool for the objective assessment of the SOC for this geographical context. In Canada, however, there is a study that presents a tool for assessing the SOC, called The Ottawa Hospital Clinical Management SOC (TOH-SOC) decision-making indicator tool [13]. This tool has been used in various hospitals in the United States and Canada, demonstrating the need to assess the SOC and to do so on a regular basis [4, 16, 24, 32, 33].

Comparing the SOC determinants identified by our Delphi study with those used in the TOH-SOC, most of them were identified by our expert panel, and some new ones are included. For instance, the professional's category exhibits a high degree of alignment with the Canadian model, with all items reflected coinciding with those of Canada. Other categories, such as the management of material resources, have been subdivided into a dimension

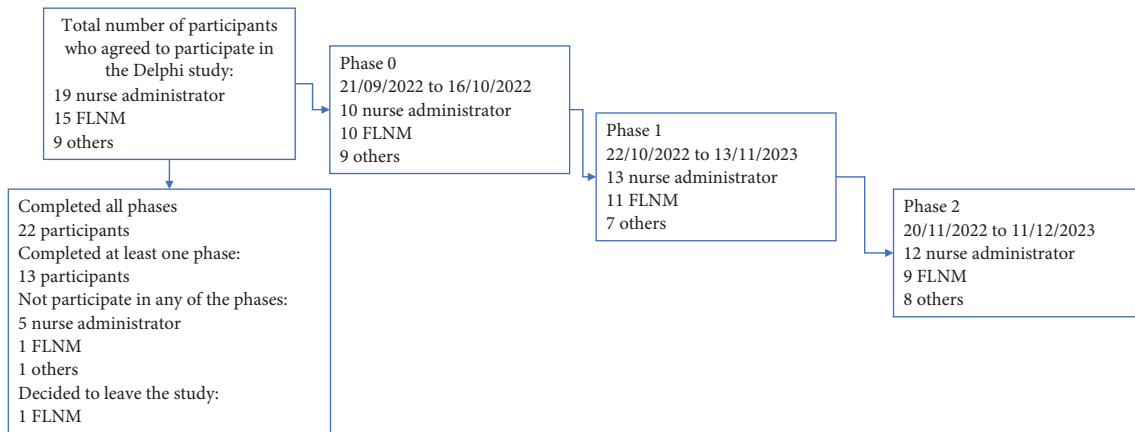


FIGURE 1: Flowchart of Delphi study phases.

TABLE 1: Description of items by phases and categories: unit, professionals, FLNM and organisation.

ID	Statement	Phase	Mean \pm SD (1-5)	IQR
U.01	Commitment to risk management and patient safety	1	4.23 \pm 0.805	1.0
		2	4.21 \pm 0.774	1.0
U.02	Variability/complexity of patient care	1	4.29 \pm 0.902	1.0
		2	4.17 \pm 0.848	1.0
U.03	Unit operating hours	1	3.26 \pm 1.316	1.5
		2	3.41 \pm 0.907	1.0
U.04	Unit working climate	1	3.84 \pm 1.157	2.0
		2	4.14 \pm 1.125	1.0
U.05	Number of different units under the permanent care of the FLNM	1	3.71 \pm 0.824	1.0
		2	3.93 \pm 1.033	2.0
U.06	Management of a large amount of equipment	1	3.68 \pm 1.107	1.0
		2	3.38 \pm 1.015	1.0
U.07	Number of patients treated in the unit	1	3.19 \pm 1.138	1.5
		2	3.31 \pm 1.072	1.0
U.08	Unit monitoring of activities, achievement or service objectives	1	3.90 \pm 0.944	2.0
		2	4.07 \pm 1.193	2.0
U.09	Interdisciplinary communication and maintenance of care processes and circuits	1	3.45 \pm 1.121	1.0
		2	3.59 \pm 1.150	1.0
U.10	Management of material resources (not included in automated replenishment systems such as Kanban)	1	3.23 \pm 1.023	1.0
		2	3.52 \pm 1.184	1.0
U.11	Communication with patients, relatives and/or carers accompanying persons	1	3.10 \pm 1.165	2.0
		2	3.62 \pm 1.147	2.0
U.12	Patient turnover rate in the inpatient units managed by the FLNM	1	2.48 \pm 1.151	1.5
		2	3.21 \pm 1.082	1.0
U.13	Frequency with which the capacity of the unit or service is exceeded	1	3.32 \pm 1.107	1.0
		2	3.14 \pm 1.093	2.0
U.14	Protocolisation, process management and standardisation	1	Na	
		2	3.93 \pm 1.033	2.0
U.15	Unpredictability of the work of the unit or service.	1	3.39 \pm 1.308	1.0
		2	3.34 \pm 1.233	1.0
U.16	Pharmacy management	1	2.90 \pm 1.106	2.0
		2	3.07 \pm 1.067	2.0
U.17	Having a clinical nurse in the unit to provide support in the management and monitoring of processes and projects	1	Na	
		2	3.31 \pm 1.365	2.0
U.18	Level of involvement of the FLNM in the patient admission and/or discharge processes in the care unit	1	Na	
		2	2.66 \pm 1.203	1.0
P.01	Number of novice professionals supervised	1	3.74 \pm 0.893	1.0
		2	4.14 \pm 0.789	1.0

TABLE 1: Continued.

ID	Statement	Phase	Mean \pm SD (1–5)	IQR
P.02	Number of professionals supervised by the FLNM	1	4.26 \pm 0.893	1.0
		2	4.10 \pm 0.939	2.0
P.03	Number of different categories of professionals under their responsibility	1	2.84 \pm 1.369	2.5
		2	3.45 \pm 0.910	1.0
P.04	Absenteeism in the unit	1	2.97 \pm 1.278	2.0
		2	3.97 \pm 0.865	1.0
P.05	Turnover rate	1	3.58 \pm 1.057	1.0
		2	3.93 \pm 0.923	0.0
P.06	Average age of professionals in the unit	1	1.71 \pm 0.973	1.0
		2	2.41 \pm 0.867	1.0
F.01	Leadership style	1	3.65 \pm 1.305	2.0
		2	4.14 \pm 0.953	1.0
F.02	Decision-making autonomy	1	4.00 \pm 1.065	1.5
		2	4.10 \pm 1.081	1.0
F.03	Education of the FLNM	1	3.48 \pm 1.313	2.0
		2	3.90 \pm 0.939	2.0
F.04	Years of experience in management	1	2.23 \pm 0.990	2.0
		2	3.10 \pm 1.235	1.0
O.01	Digitalisation and technological support: HR management, management of material resources and general services and information systems	1	4.10 \pm 1.076	1.0
		2	4.04 \pm 0.778	1.0
O.02	Competence assessment and identification of training needs of the unit's professionals	1	3.65 \pm 1.199	2.0
		2	4.04 \pm 0.906	1.0
O.03	Participation in research projects, EBP, R&D&I and dissemination of results	1	3.00 \pm 1.155	2.0
		2	3.82 \pm 0.902	1.0
O.04	Presence of students in the unit	1	2.61 \pm 0.989	1.0
		2	3.36 \pm 0.942	1.0
O.05	Existence of transversal support units to support the FLNM	1	2.74 \pm 1.125	1.5
		2	3.32 \pm 1.143	2.0
O.06	Carrying out guards as FLNM	1	2.19 \pm 1.167	2.0
		2	3.14 \pm 1.302	2.0

Note: Items not available in Phase 1. The IC of the mean assumes that the sample means follow a *t*-distribution with N-1 degrees of freedom.

Abbreviations: EBP, evidence-based practice; FLNM, first-line nurse manager; IQR, interquartile range; Na, not available; O, organisation; P, professional; R&D&I, research, development and innovation; U, unit.

comprising items, thereby differentiating the management of materials, equipment and pharmacy. Amongst those items that do not appear in our research are the following: 'actual litigation', 'number of directors' and 'budget', all of which are more related to the characteristics of the health systems from which the assessment tool originates.

Most studies on the SOC are based on the number of people reporting to a superior and the consequences on the different parties involved. These consequences may include, for example, increased medication errors and nosocomial infections [16], affecting the satisfaction of the FLNM [4] or the organisational behaviours of nurses [23]. Attempting to solve the problem by focussing on the consequences without first identifying the source of the problem may result in inappropriate measures being taken. Consequently, it is imperative to ascertain the factors that influence the SOC of FLNMs in order to implement targeted interventions at the source of the problem.

In general, organisations do not take the SOC into account when designing their staffing structure [34] and, in the case of nursing, it is common to overlap medical units with

nursing units, without considering that the role of a FLNM goes far beyond the management of human and materials [19, 32, 35, 36]. It is important to consider the desired outcomes for these units and the organisation, such as improving quality of care, increasing professional satisfaction or reducing costs associated with middle management positions. As resources are limited, managers and organisations need to work together to fine-tune the SOC to achieve the greatest number of objectives [37].

It is at this point that the SOC needs to be measured to assess its adequacy and to provide the necessary support to FLNMs. Understanding the key aspects that determine the SOC can lead to an improved working environment for nurses, the delivery of high quality patient care and a reduction in costs for organisations [38]. In fact, to support FLNMs sometimes is only needed administrative assistance [33] or a comanager [39, 40]. This support can lead to increased job satisfaction and a lower risk of burnout syndrome, which in turn reduces the likelihood of employees leaving their jobs [25, 41]. In addition, it can result in improved performance for the units and teams that they lead.

TABLE 2: Rating of items on unit characteristics by phase, expert group and overall agreement percentage.

ID	Unit characteristics Statement	Delphi Phase 1			Delphi Phase 2			Was the item accepted?
		Group	Mean	Item acceptance	Group	Mean	Item acceptance	
U.01	Commitment to risk management and patient safety	NA FLNM Others	4.31 4.09 4.29	96.77%	NA FLNM Others	4.58 4.00 3.88	100%	Yes
U.02	Variability/complexity of patient care	NA FLNM Others	4.31 4.00 4.71	96.77%	NA FLNM Others	3.92 4.11 4.63	100%	Yes
U.03	Unit operating hours	NA FLNM Others	3.31 3.27 3.14	87.10%	NA FLNM Others	3.83 3.00 3.25	100%	Yes
U.04	Unit working climate	NA FLNM Others	4.08 3.45 4.00	90.32%	NA FLNM Others	4.50 3.22 4.63	96.55%	Yes
U.05	Number of different units under the permanent care of the FLNM	NA FLNM Others	3.46 4.00 3.71	100%	NA FLNM Others	3.58 4.33 4.00	96.55%	Yes
U.06	Management of a large amount of equipment	NA FLNM Others	3.69 3.55 3.86	93.55%	NA FLNM Others	3.08 3.78 3.38	96.55%	Yes
U.07	Number of patients treated in the unit	NA FLNM Others	3.38 2.82 3.43	77.42%	NA FLNM Others	3.00 3.11 4.00	96.55%	Yes
U.08	Unit monitoring of activities, achievement of service objectives	NA FLNM Others	4.15 3.36 4.29	100%	NA FLNM Others	4.58 3.44 4.00	93.1%	Yes
U.09	Interdisciplinary communication and maintenance of care processes and circuits	NA FLNM Others	3.62 3.18 3.57	87.10%	NA FLNM Others	3.92 3.00 3.75	93.1%	Yes
U.10	Management of material resources (not included in automated replenishment systems such as Kanban)	NA FLNM Others	3.15 3.36 3.14	96.77%	NA FLNM Others	3.50 3.56 3.50	93.1%	Yes
U.11	Communication with patients, relatives and/or carers accompanying persons	NA FLNM Others	3.15 3.00 3.14	80.64%	NA FLNM Others	3.92 2.89 4.00	93.1%	Yes
U.12	Patient turnover in the inpatient units managed by the FLNM	NA FLNM Others	2.46 2.27 2.86	64.52%	NA FLNM Others	3.00 3.11 3.63	93.1%	Yes
U.13	Frequency with which the capacity of the unit or service is exceeded	NA FLNM Others	2.77 4.00 3.29	80.64%	NA FLNM Others	3.17 2.89 3.38	93.1%	Yes

TABLE 2: Continued.

ID	Unit characteristics Statement	Delphi Phase 1			Delphi Phase 2			Was the item accepted?
		Group	Mean	Item acceptance	Group	Mean	Item acceptance	
U.14	Protocolisation, process management and standardisation	Items added in Phase 2	4.00	93.1%	NA FLNM Others	4.00 4.00 3.75	93.1%	Yes
U.15	Unpredictability of the work of the unit or service	NA FLNM Others	3.62 3.64 2.57	83.87%	NA FLNM Others	3.50 3.33 3.13	82.75%	Yes
U.16	Pharmacy management	NA FLNM Others	2.92 2.64 3.29	87.10%	NA FLNM Others	3.17 3.11 2.88	82.75%	Yes
U.17	Having a clinical nurse in the unit to provide support in the management and monitoring of processes and projects	Items added in Phase 2	3.33 3.67 2.88		NA FLNM Others	3.33 3.67 2.88	75.86%	No
U.18	Level of involvement of the FLNM in the patient admission and/or discharge processes in the care unit	Items added in Phase 2	2.42 2.89 2.75		NA FLNM Others	2.42 2.89 2.75	65.51%	No

Note: Items accepted: More than 80% of participants agreed with the item, with an average score of three or more on the five-point scale.
Abbreviations: FLNM, first-line nurse manager; NA, nurse administrator.

TABLE 3: Rating of items on professional characteristics by phase, expert group and item acceptance.

Characteristics of professionals		Delphi Phase 1			Delphi Phase 2			Was the item accepted?
ID	Statement	Group	Mean	Item acceptance	Group	Mean	Item acceptance	
P.01	Number of novice professionals supervised	NA	3.69	93.55%	NA	3.92	100%	Yes
		FLNM	3.91		FLNM	4.33		
		Others	3.57		Others	4.25		
P.02	Number of professionals supervised by the FLNM	NA	4.15	100%	NA	3.83	100%	Yes
		FLNM	4.64		FLNM	4.00		
		Others	3.86		Others	3.75		
P.03	Number of different categories of professionals under their responsibility	NA	2.85	74.19%	NA	3.33	100%	Yes
		FLNM	2.64		FLNM	3.44		
		Others	3.14		Others	3.63		
P.04	Absenteeism in the unit	NA	3.00	74.19%	NA	3.67	96.55%	Yes
		FLNM	2.73		FLNM	4.33		
		Others	3.29		Others	4.00		
P.05	Turnover rate	NA	3.85	87.10%	NA	3.83	93.10%	Yes
		FLNM	3.18		FLNM	4.53		
		Others	3.71		Others	4.25		
P.06	Average age of professionals in the unit	NA	1.85	32.26%	NA	2.75	65.52%	No
		FLNM	1.45		FLNM	2.00		
		Others	1.86		Others	2.38		

Note: Items accepted: More than 80% of participants agreed with the item, with an average score of three or more on the five-point scale. Abbreviations: FLNM, first-line nurse manager; NA, nurse administrator.

TABLE 4: Rating of items on FLNM characteristics by phase, expert group and item acceptance.

FLNM characteristics		Delphi Phase 1			Delphi Phase 2			Was the item accepted?
ID	Statement	Group	Mean	Item acceptance	Group	Mean	Item acceptance	
F.01	Leadership style	NA	3.77	83.87%	NA	4.33	96.55%	Yes
		FLNM	3.27		FLNM	3.67		
		Others	4.00		Others	4.38		
F.02	Decision-making autonomy	NA	3.92	90.32%	NA	3.92	93.1%	Yes
		FLNM	4.00		FLNM	4.00		
		Others	4.14		Others	4.50		
F.03	Education of the FLNM	NA	3.92	87.10%	NA	4.08	93.1%	Yes
		FLNM	2.64		FLNM	3.67		
		Others	4.00		Others	3.77		
F.04	Years of experience in management	NA	2.23	51.61%	NA	3.17	82.75%	Yes
		FLNM	2.27		FLNM	2.78		
		Others	2.14		Others	3.38		

Note: Items accepted: More than 80% of participants agreed with the item, with an average score of three or more on the five-point scale. Abbreviations: FLNM, first-line nurse manager; NA, nurse administrator.

The results of our study show that 31 items should be considered to determine the SOC of a FLNM. The inclusion of a panel of experts with a variety of perspectives is necessary to get a complete picture of the determinants of the SOC of FLNMs. This study included the views not only of FLNMs, but also of nurse administrators, university nursing professors and health management economists, both active and retired, from different regions of Spain. Although this approach may have reduced consensus on certain points, it enabled us to achieve the proposed objective of this research.

One of the most crucial aspects of implementing any change within an organisational setting is to ensure the involvement of all relevant parties at each stage of the

process [42–46]. Only through this approach can critical points that might otherwise go unnoticed be identified. Furthermore, when decisions are made through a shared and consensual process, the implementation and acceptance by employees is more straightforward. This need for diverse perspectives has motivated the inclusion of professionals from different fields in our study. A critical aspect that was taken into account was the positions held by the panellists, who were national nurse leaders. It was recognised that power differentials amongst participants could have a significant impact on the quality of the data if an alternative method, such as focus group interviews, had been used to collect the data.

TABLE 5: Rating of the items on the organisation characteristics, by phases, expert group and item acceptance.

ID	Characteristics of organisations Statement	Delphi Phase 1			Delphi Phase 2			Was the item accepted?
		Group	Mean	Item acceptance	Group	Mean	Item acceptance	
O.01	Digitalisation and technological support: HR management, management of material resources and general services and information systems	NA	4.23	96.77%	NA	3.91	100%	Yes
		FLNM	3.91		FLNM	4.22		
		Others	4.14		Others	4.00		
O.02	Competence assessment and identification of training needs of the unit's professionals	NA	3.23	87.10%	NA	3.82	100%	Yes
		FLNM	4.00		FLNM	4.56		
		Others	3.86		Others	3.75		
O.03	Participation in research projects, EBP, R&D&I and dissemination of results	NA	3.54	80.64%	NA	3.73	96.55%	Yes
		FLNM	2.27		FLNM	4.11		
		Others	3.14		Others	3.63		
O.04	Presence of students in the unit	NA	2.77	80.64%	NA	3.18	96.55%	Yes
		FLNM	2.45		FLNM	3.56		
		Others	2.57		Others	3.38		
O.05	Existence of transversal support units to support the FLNM	NA	3.08	67.74%	NA	3.27	96.55%	Yes
		FLNM	2.36		FLNM	3.11		
		Others	2.71		Others	3.63		
O.06	Carrying out guards as FLNM	NA	2.08	51.61%	NA	3.55	82.75%	Yes
		FLNM	2.18		FLNM	3.22		
		Others	2.43		Others	2.50		

Note: Items accepted: More than 80% of participants agreed with the item, with an average score of three or more on the five-point scale.
Abbreviations: EBP, evidence-based practice; FLNM, first-line nurse manager; NA, nurse administrator; R&D&I: research, development and innovation.

It is important to note that a large number of the determinants identified relate to the characteristics of the unit or units responsible for the FLNM. These determinants include the 'unit working environment', which to a large extent influences the interaction between professionals and the degree of support and cooperation [47–51]. If the working environment is positive, it will make it easier to achieve the unit's goals and will allow users to perceive that the staff are working as a team, thereby improving the patient experience. It is noticeable that FLNMs are the ones who rate this item the lowest, especially when they are in direct contact with staff. This may be due to their experience in their own units, with fewer conflicts and a favourable working environment.

In the case of the nurse administrators, they gave greater importance to aspects such as the achievement of objectives and risk management [52, 53], the working climate of the unit [54, 55] and the management style of the FLNM [56, 57]. These results are to be expected, given that their functions and experience give them an overall view of the organisation, a global vision and distance from the aspects that characterise the day-to-day running of the nursing units and services.

On the contrary, the contributions of the FLNMs had their highest scores in aspects related to human resource management, such as staff turnover, number of new professionals and staff absenteeism in their units. These results are not surprising, given that managing staff to keep units running can take up 20%–40% of the FLNM's working time [58]. This can be seen as the visible part of the iceberg of managing a nursing unit.

One aspect that should be highlighted for its novelty, and which is not included in the TOH-SOC tool, is that the panel of experts has added a number of determinants related to the FLNM, such as the management style exercised, the autonomy granted to them in decision-making, training (both before and after access to the management position) and years of experience in management functions. Particularly noteworthy in this study is the training of FLNMs and the low importance they themselves attach to it. In our view, this is one of the fundamental pillars that will characterise their performance as nurse managers. Specific training at the time of taking up the position should not be a prerequisite, but it would be highly recommended that FLNMs receive structured training at the time of taking up the position. Training should be at masters level in management, on the basis that clinical expertise does not prepare the new nurse manager for the wide range of competencies required for success [21, 59]. This will allow them to gain a broader range of knowledge and tools, as well as an overview of the organisation as a whole.

The leadership style employed by FLNMs when directing work teams is of particular relevance. The FLNM is responsible for the leadership of their nursing units, thus becoming a management element with the potential to positively impact the quality of care in their unit. In order for FLNMs to be able to exercise leadership, they must have the necessary conditions in their workplace, including an ideal SOC. In Doran's words, 'no leadership style can overcome

the effects of a wide SOC' [7] in order to achieve these objectives. This training should also be complemented by leadership training, which is essential to strengthen their management skills, promote a positive working environment, improve the quality of care and ensure better coordination and communication within the care team [33, 60]. Of the different types of leadership, FLNMs should be trained in relational leadership [61] and, above all, transformational leadership [22, 62, 63], as it is an effective model for improving healthcare quality and outcomes, professional commitment and patient satisfaction, all through empowering and motivating professionals.

It is interesting to note the assessment of autonomy in decision-making, which was one of the highest rated items overall by the expert panel. As described in previous research, autonomy is associated with higher levels of empowerment and job satisfaction, leading to improved organisational commitment, reduced job stress and higher employee retention [54, 64]. We should not forget that FLNMs, as middle managers in a strategic position between central management and professionals, can provide an operational and efficient response in a variety of situations, thus reducing bureaucracy within organisations. The establishment of this trust in the FLNM's ability to perform its duties effectively represents a model of positive leadership from the nurse administrators towards their subordinates. Furthermore, it demonstrates a commitment to the decentralisation of work and decision-making.

5. Limitations

This study has several limitations. Firstly, it was carried out in only one country, Spain. Therefore, the findings are only applicable to the country in which the study was conducted, although they could be relevant to other similar health systems. Furthermore, the outcomes could serve as a foundation for researchers in other contexts or health systems, enabling them to tailor them to their specific circumstances.

Contact with potential members of the expert panel was made through the Asociación Nacional de Enfermeras Gestoras (ANDE), contacts of the coordinating group and the use of social media profiles of other professionals with recognised nursing expertise. This may have resulted in some relevant nurse leaders and their expertise being excluded. In addition, not all experts participated in all phases of the study, so results may have varied depending on their responses.

A disadvantage of the Delphi approach identified in the literature relates to the clear definition of consensus. The literature suggests that 51%–70% agreement represents consensus. In our study, to overcome this limitation and as a strength of the study, consensus was set at over 80%.

6. Conclusions

Our research shows a high degree of consensus amongst participants on the determinants and degree of relevance of SOC-related issues. This makes it clear that, although SOC assessment is not currently taken into account, all

stakeholders strongly identify the variables that should be taken into account when appointing a FLNM.

The participation of a panel of experts at the national level has allowed the identification of a total of 31 items, grouped into 4 dimensions (unit, professionals, FLNM, and organisation) that should be considered to assess the SOC of FLNMs in Spanish public hospitals.

7. Implications for Nursing Management

By understanding the determinants of the SOC of the FLNM, nurse administrators could better understand and assess the status of the organisation and facilitate the FLNM's capacity to adopt an effective leadership style, thereby preventing them from departing from their position. Leadership exerts a considerable influence on the quality of care delivered in their unit and on employee engagement and conduct.

As the results of the present study are refined, it will be possible to develop a tool for weighing the factors influencing SOC, thus facilitating the creation of a common framework for discussion. This tool will enable hospital managements to develop a unified standard for the assessment of the demands of FLNMs, which together with other aspects such as competency development will lead to interventions to improve the working conditions of nurse managers. Creating a robust, grounded tool that objectively assesses SOC will be an important support instrument in assessing the expanding roles of the FLNM. A correct determination of the SOC, carried out periodically, together with the appropriate support measures, can influence an improvement of the results observed in patients, professionals and the organisation.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics Statement

This study was approved by Comité de Ética de la Investigación de la Comunidad Autónoma de Aragón: CEICA (C.P.–C.I. PI22/351).

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

Conceptualisation, Ángel Boned-Galán; methodology, Ángel Boned-Galán, Nieves López-Ibort, Ana I. Gil-Lacruz and Ana Gascón-Catalán; investigation, Ángel Boned-Galán, Nieves López-Ibort, Ana I. Gil-Lacruz and Ana Gascón-Catalán; writing–original draught preparation, Ángel Boned-Galán and Nieves López-Ibort; writing–review and editing, Ángel Boned-Galán, Nieves López-Ibort, Ana I. Gil-Lacruz and Ana Gascón-Catalán; supervision, Ana Gascón-Catalán.

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Research Article

Development and Effect of an Interactive Simulated Education Program for Psychological First Aid: A Randomized Controlled Trial

Eun-Joo Choi¹ and Yun-Jung Choi² 

¹Kyung-In Women's University, Department of Nursing, Incheon, Republic of Korea

²Chung-Ang University, Red Cross College of Nursing, Seoul, Republic of Korea

Correspondence should be addressed to Yun-Jung Choi; yunjungchoi@cau.ac.kr

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Background. Considering the importance of psychological first aid, which is the first priority when a disaster occurs, developing a web-based simulation training program for nurses and confirming its effectiveness is necessary. **Aim.** This study aimed to develop an interactive simulated education program as a psychological first aid program for nurses and verify its effectiveness. **Participants.** Nurses working in hospitals and the community who had not participated in psychological first aid training in the last year were recruited. **Methods.** A web-based interactive simulated educational program for psychological first aid was developed. To verify its effectiveness, a randomized controlled trial design was used. The experimental group participated in a web-based educational program, while the control group was provided self-learning data in the form of e-books. The program's effects on disaster response core competencies, problem-solving abilities, and self-leadership capacity were measured. We used descriptive statistics to analyze the general characteristics, and independent *t*-tests were used to analyze the differences before and after the intervention. **Results.** The core competencies for disaster response ($t = -2.239$, $p < 0.05$, Cohen's $d = 0.59$), problem-solving abilities ($t = -2.753$, $p < 0.01$, Cohen's $d = 0.72$), and self-leadership capacity ($t = -2.073$, $p < 0.05$, Cohen's $d = 0.54$) showed a statistically significant difference between groups. **Conclusions.** The web-based simulation education program for psychological first aid training developed in this study effectively enhanced nurses' ability to respond to disasters and improved their problem-solving abilities and self-leadership capacity. Thus, nurses can use the educational program as a tool to learn psychological first aid. This trial is registered with KCT0008965.

1. Introduction

Earthquakes are natural disasters with an immense capacity for destruction that cause large-scale casualties and enormous economic losses over a short period of time. In addition to social and economic damage, they can cause psychological problems among victims [1]; residents of earthquake-damaged areas experience long-term anxiety, depression, post-traumatic stress, and suicidal thoughts [2]. They may find it difficult to return to daily life and experience post-traumatic stress disorder if such psychological problems are overlooked [3].

To overcome this challenge, psychological first aid (PFA) is provided to victims at a disaster site. This refers to the

activities conducted immediately after a disaster to help victims with their practical needs and reduce their psychological problems [3, 4]. As an essential activity, PFA is prioritized at disaster sites to meet the psychological needs of disaster victims and prevent post-traumatic stress disorder [5]. To effectively perform PFA, one must be familiar with the characteristics of disasters and psychological problems of victims, in addition to having disaster response capabilities to cope with such situations [6]. However, practitioners deployed at disaster sites experience empathy fatigue, secondary trauma, and exhaustion while performing PFA. Therefore, increasing their ability to care for and manage their needs is crucial [7]. For example, when self-leadership

is high, work performance [8] and problem-solving improve [9].

Disasters have characteristics that are difficult to fully reproduce through traditional methods such as role-play or simulation education [10]. However, with varying degrees of realism and fidelity, it is possible to effectively simulate disaster scenarios. As such, providing learners with a sense of realism through web-based simulation education is important [11, 12]. Learning through experience is an important element of simulations; accordingly, Kolb [13] emphasized the importance of experience in learning, explaining that learning is a continuous process that combines experience, cognition, perception, and action.

Online education has seen a significant rise in popularity in recent times, with gradual use of web-based simulation education [14]. Web-based simulations have the advantage of transcending spatial and temporal limitations [15] and allowing for repeated learning and immediate feedback [16].

Web-based virtual practice uses standardized patients rather than graphics to ensure learners experience a higher sense of realism [17]. Considering the importance of PFA, developing a web-based PFA simulation training program can be an effective educational strategy for expanding learners' capabilities. Therefore, this study aimed to develop a web-based interactive PFA simulation training program and verify its effects on the disaster response core competencies, problem-solving, and self-leadership of nurses involved in earthquake relief.

2. Methods

2.1. Study Design

2.1.1. Development of the Web-Based PFA Simulated Education Program. The program was developed following the five stages of the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation).

In the analysis stage, major educational topics and content were developed based on both domestic and international education materials and practical guidelines on PFA. To identify education needs, interviews were conducted with eight community nurses who had completed PFA training. These interviews revealed the necessity for realistic and highly immersive education, the opportunity for repeated participation, and an online format for the training.

In the design stage, educational objectives and content were structured for each phase, including pre-learning, pre-briefing, simulation, and debriefing.

The process in the development stage comprised three phases. The first phase involved developing the simulation scenarios and quizzes. The researcher created the content through a literature review, preliminary needs assessment, and consultations with one disaster mental health expert, two case managers, and nine earthquake disaster victims in South Korea. The second phase involved producing the simulation videos, wherein standardized patients and nurses acted according to the scenarios. The third phase involved

creating multimedia content following a storyboard that was developed using Articulate Storyline 3.

In the implementation stage, the developed content was tested and evaluated. Six experts in system development conducted a heuristic evaluation to identify issues with the system interface [18]. The evaluation scores averaged 4.26 ± 0.22 out of 5 points, and the converted score out of 100 was 85.15 ± 4.47 . Additionally, to verify the usability and educational effectiveness of the online program from the user's perspective, user evaluations were conducted with 10 nurses holding at least a master's degree. The educational content was evaluated using a 5-point Likert scale. The usability and usefulness of the content were assessed using a tool for evaluating virtual gaming simulation [19].

The evaluation, usability, and usefulness of the content averaged 4.46 ± 0.46 , 4.41 ± 0.43 , and 4.45 ± 0.44 out of 5 points, respectively. The converted scores, respectively, were 89.17 ± 9.14 , 88.20 ± 8.56 , and 89.00 ± 8.76 out of 100 points. Additional feedback included issues such as video playback stopping intermittently, requests to change the position of the navigation buttons, providing information on the sequence of the quiz questions, and reducing the display time of the quiz pop-ups. The results and feedback from experts and user evaluations were incorporated into the revisions, and the final version of the content was based on these inputs.

Lastly, the evaluation stage aimed to confirm the effectiveness of the developed web-based program.

2.1.2. Evaluation of the Web-Based PFA Simulated Education Program.

This study was designed as a single-blind randomized controlled trial to evaluate the effectiveness of the program. The effects of the program were evaluated by a single researcher. The principal researcher generated the random allocation sequence, enrolled participants, and assigned participants to interventions. The guidelines outlined in the CONSORT statement for reporting randomized controlled trials were adhered to. Participants were randomly assigned to either the experimental group, which received the web-based PFA interactive simulated education, or the control group, which received self-learning materials in the form of e-books. To maintain a single-blind design, the group assignments were known only to the researchers to properly administer the interventions, and not to the participants (Figure 1).

2.2. Participants. The inclusion criteria for participation included being nurses working in hospitals and the community who had not participated in PFA training in the last year as well as having access to a personal computer and being able to use it without difficulty. The exclusion criteria included nurses who were undergoing treatment for any illnesses or who had difficulty operating the online program. The sample size was calculated using G*power 3.1.9.2. Based on a comparison of two groups (*t*-test) in simulation-based intervention studies [20], the required sample size was determined with a significance level (α) of 0.05, power ($1-\beta$)

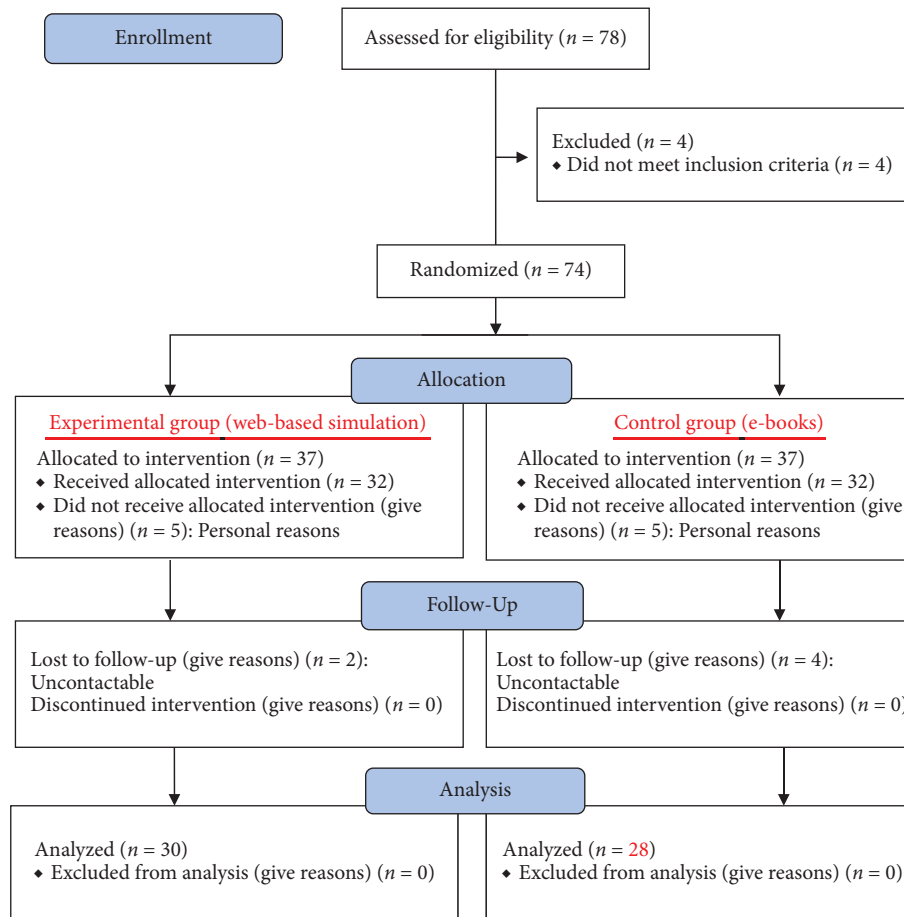


FIGURE 1: CONSORT diagram.

of 0.80, and effect size (d) of 0.8. The results indicated that 52 participants were needed. Considering the potential dropout rate, the sample size was increased to 60, with 30 participants in the experimental group and 30 in the control group. The researcher posted recruitment notices on social network communities of hospitals and organizations in five South Korean cities and explained the purpose and methods of the study to the potential participants. Written consent was obtained from the nurses who agreed to participate in the study.

Initially, 74 participants agreed to participate and completed the pre-survey questionnaire. Serial numbers were assigned in the order of registration to the study participants and the SPSS randomization function was used to determine the experimental and control groups. The participants were not informed to which group they belonged. After completing the pre-survey questionnaire and prior to the intervention, two participants from the experimental group of 37 could not be contacted, and five could not participate owing to personal reasons. In the control group of 37, four participants could not be contacted and five could not participate owing to personal reasons. The final number of participants was 30 in the experimental group and 28 in the control group.

2.3. Measurements. To evaluate the effectiveness of the program, we administered the Perceived Competence Scale for Disaster Mental Health Workforce (PCS-DMHW) to the participants and assessed their problem-solving ability and self-leadership capacity both before and after the intervention. The pre-assessment also included one additional section on participants' sociodemographic characteristics, including sex, age, religion, years of work experience, field of work, and history of PFA training.

2.3.1. Disaster Response Core Competencies. To measure disaster response core competencies, the PCS-DMHW, developed by Yoon and Choi [21], was used. This tool measures the competencies required for mental health personnel to effectively respond to disasters. It includes 24 questions: six on knowledge (disaster understanding and customized support), nine on attitude (vocation, ethics, and qualifications), and nine on skills (problem-solving, communication, and information delivery). The answers are scored on a 5-point Likert scale ranging from 0 (not at all true) to 4 (strongly true). Total scores range from 0 to 96, with a higher score indicating a higher perception of competence in the relevant area [21]. Cronbach's α was 0.95 for Yoon and Choi [21] and 0.91 in this study.

2.3.2. Problem-Solving Ability. Problem-solving ability was measured using the process behaviors of problem-solving developed by Lee et al. [22] and revised by Park and Woo [23]. This tool comprises 25 questions on problem discovery, problem definition, devising a solution to the problem, implementing the solution, and reviewing the solution. The answers are rated on a 5-point Likert scale ranging from 1 (not very) to 5 (almost always), with total scores ranging from 25 to 125. Higher scores indicate a better problem-solving process. Cronbach's α was 0.90 for Park and Woo [23] and 0.95 in this study.

2.3.3. Self-Leadership Capacity. Kim [24] translated a self-leadership questionnaire developed by Manz [25] to measure self-leadership capacity. It comprises 15 questions across six subscales (self-expectation, rehearsal, goal-setting, self-reward, self-criticism, and constructive thinking). The answers are rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much), with total scores ranging from 15 to 75. Cronbach's α was 0.90 for Kim [24] and 0.90 in this study.

2.4. Procedure. The researchers created a storyboard of the pre-learning, pre-briefing, simulation, and debriefing screens. Details such as sound effects, blinking, and characters were selected for each scene, and the narration was created as an MP3 file using an artificial intelligence voice actor. The content was produced by a content development expert using Articulate Storyline 3 (Figure 2). The content was then reviewed and revised more than five times by the researcher.

A uniform resource locator (URL) allowing access to the program was sent to the experimental and control groups. By clicking on the URL, a screen opened in a new browser window, and the learner could participate in the training. The intervention was conducted between November 1 and November 7, 2020. The web-based PFA simulation applied to the experimental group was an educational program comprising four learning areas: pre-learning, pre-briefing, simulation, and debriefing (Table 1). The time required for learning ranged from 50 minutes to 1 hour. The control group was provided psychological support material in an e-book format. The e-book included only text and comprised 44 pages. After reading one page, participants had to click an arrow to move to the next page. The self-study content covered psychological support systems in the aftermath of earthquakes, characteristics of earthquakes, PFA, stabilization therapy, and frequently asked questions by earthquake victims.

2.5. Data Collection. Data were collected using an online questionnaire created by the researcher using Google Forms. Informed consent was obtained from all participants prior to data collection. Participants agreed to participate by checking a consent box on the first page of the Google Forms survey. The survey included items from the PCS-DMHW as well as items on problem-solving

ability, critical thinking, and sociodemographic characteristics. When the researcher sent a link to the pre-questionnaire on a participant's social networking service, the participant clicked on the link and completed the questionnaire. The time required to complete the preliminary questionnaire was 15–20 minutes. Participants were required to provide their names to match the pre- and post-survey responses. The survey clearly stated that participants' names would be replaced with unique identification numbers after the completion of the post-survey. After all surveys were completed, the researcher replaced the participants' names with identification numbers. The data are stored on a password-protected computer accessible only to the researcher.

2.6. Data Analysis. The collected data were analyzed using SPSS/Mac SPSS 26.0. Participants' general characteristics, disaster response core competencies, problem-solving processes, and levels of self-leadership were analyzed using frequency, percentage, average, and standard deviation.

To assess pre-intervention homogeneity between the experimental and control groups, chi-square tests, Fisher's exact tests, and independent samples *t*-tests were used. Additionally, the homogeneity of the dependent variables between the experimental and control groups was assessed using independent samples *t*-tests. The normality of the distributions in both groups was tested using the Shapiro–Wilk test. Finally, to evaluate the effectiveness of the simulation education program, changes in the research variables before and after the intervention were analyzed using independent samples *t*-tests. Cohen's *d* was used to calculate effect sizes using means and standard deviations from pre- to post-test. According to Cohen [26], effect sizes of 0.20, 0.50, and 0.80 represent small, moderate, and large effects, respectively.

2.7. Ethical Considerations. This study was approved by the Chung-Ang University Institutional Review Board. Participants who voluntarily agreed to participate signed a written consent form. They were informed that they could stop or withdraw from the study at any time. Their personal information was anonymized for confidentiality. After the study, the data will be stored for three years and then disposed of in a manner that makes restoration impossible.

3. Results

3.1. Demographic and Clinical Characteristics. Table 2 presents the demographic and clinical characteristics of the participants. The mean age of the experimental group was 38.47 ± 9.37 years and that of the control group was 37.86 ± 6.85 years. The experimental and control groups had 12.83 ± 7.84 years and 12.93 ± 6.39 years of work experience, respectively. A total of 21 (70.0%) nurses in the experimental group and 23 (82.1%) in the control group had not participated in PFA training in the past; there was

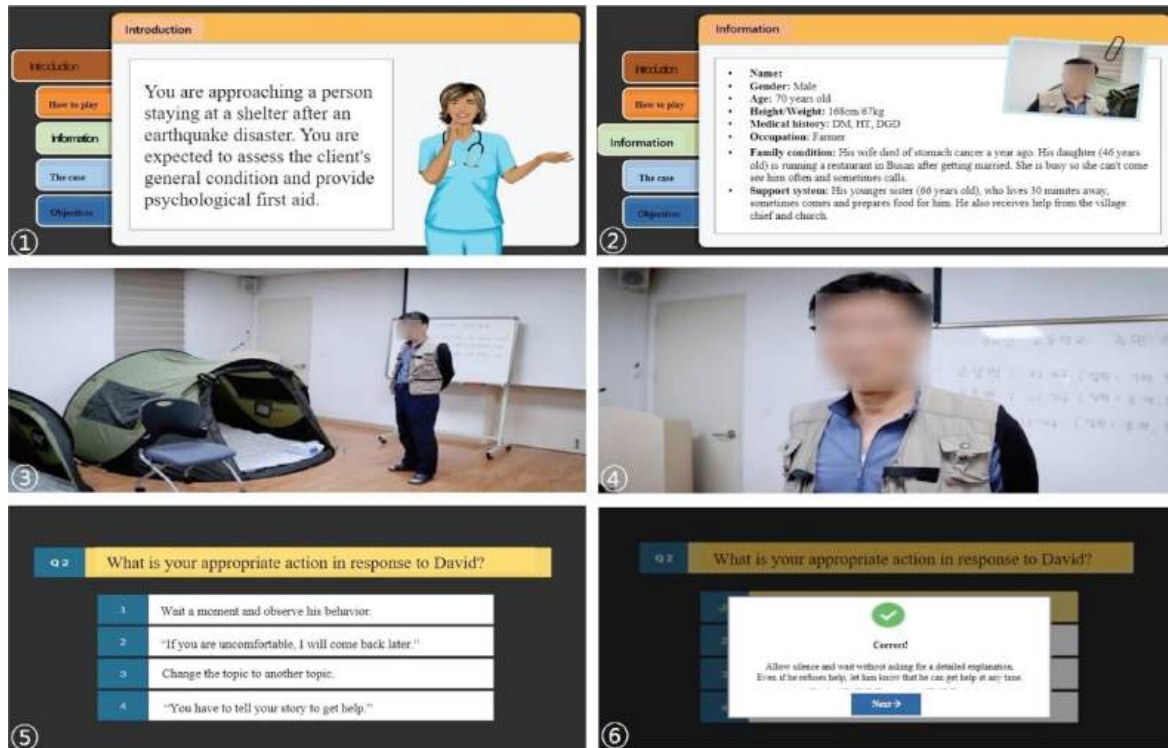


FIGURE 2: The interactive simulation game for PFA. Note: ① introducing the context of the simulation, ② providing general information of the client, ③ the first scene of the simulation, ④ interactive simulations from the learner’s perspective, ⑤ taking quiz games during the simulation, and ⑥ providing real-time quiz commentaries.

TABLE 1: Content of the web-based simulation program for psychological first aid training.

Main menu	Middle menu	Submenu
Pre-learning	Earthquake	(i) Earthquake video (ii) Characteristics of earthquakes
	Disaster mental health	(i) Definition of disaster (ii) Characteristics of disaster victims
	Psychological first aid	(i) Definition of PFA (ii) Steps, preparations, attitude (iii) Basic goals (iv) Caution (v) Core activities of PFA (vi) Self-care
	Organizational structure	(vii) Role of organizations
Pre-briefing	Introduction	Introducing the simulation scenario (informing users that they must visit a disaster site and perform PFA), explaining that a quiz is presented
	How to participate	Instructions on how to participate in the quiz
	Client information	Providing general information of the client
	Client situation	Description of the subject’s situation when an earthquake occurs
	Learning objectives	Present five learning goals
Simulation		12 video clips and 11 quiz games
Debriefing		Self-debriefing—click the menu to go to the debriefing screen and write

no statistically significant difference between both groups according to PFA training experience ($\chi^2 = 1.17, p = 0.363$). Furthermore, there were no statistically significant differences between both groups in terms of all general characteristics; therefore, the experimental and control groups were homogeneous.

3.2. *Effects of the Program.* Table 3 presents the effects of the program. The experimental group’s disaster response core competencies score increased from 51.20 ± 10.46 to 73.93 ± 12.28 after the program, while the control group’s score increased from 54.68 ± 12.11 to 69.57 ± 9.44 , indicating a statistically significant difference between the two groups

TABLE 2: General characteristics and homogeneity of participants ($N=58$).

Characteristics	EG ($n=30$)		CG ($n=28$)		t/χ^2	p	
	Mean \pm SD						
Years working	12.83 \pm 7.84		12.93 \pm 6.39		0.05	0.960	
Age	38.47 \pm 9.37		37.86 \pm 6.85		-2.28	0.780	
Frequency (%)							
Sex	Female	30	(100.0)	28	(100.0)	—	—
Religious activities	Yes	19	(63.3)	15	(53.6)	0.57	0.595
	No	11	(36.7)	11	(46.4)		
Work department	Mental health	19	(63.3)	17	(60.7)	0.04	1.000
	Others	11	(36.7)	11	(39.3)		
PFA education	Have	9	(30.0)	5	(17.9)	1.17	0.363
	None	21	(70.0)	23	(82.1)		

Note. CG = control group; EG = experimental group; n = number; SD = standard deviation.

TABLE 3: Effects of the program ($N=58$).

Variables	Groups	Pre-test	Post-test Mean \pm SD	Difference	ES (d)	t	p
Core competencies	EG ($n=30$)	51.20 \pm 10.46	73.93 \pm 12.28	22.73 \pm 13.25	0.59	-2.239	0.029*
	CG ($n=28$)	54.68 \pm 12.11	69.57 \pm 9.44	14.89 \pm 13.41			
Problem-solving	EG ($n=30$)	75.90 \pm 15.82	90.57 \pm 16.56	14.67 \pm 10.53	0.72	-2.753	0.008**
	CG ($n=28$)	76.75 \pm 16.80	82.64 \pm 17.91	5.89 \pm 13.64			
Self-leadership	EG ($n=30$)	56.87 \pm 9.01	62.07 \pm 8.59	5.20 \pm 6.09	0.54	-2.073	0.043*
	CG ($n=28$)	57.14 \pm 7.72	59.00 \pm 6.81	1.86 \pm 6.18			

Note. CG = control group; d = Cohen's d ; EG = experimental group; ES = effect size; SD = standard deviation; * $p < 0.05$; ** $p < 0.01$.

($t = -2.239$, $p = 0.029$). This result demonstrated a medium effect size (Cohen's $d = 0.59$).

The experimental group's problem-solving process score changed from 75.90 \pm 15.82 to 90.57 \pm 16.56 after the program, while that of the control group increased from 76.75 \pm 16.80 to 82.64 \pm 17.91, indicating a statistically significant difference between the two groups ($t = -2.753$, $p = 0.008$). This improvement demonstrated a medium effect size (Cohen's $d = 0.72$).

The experimental group's self-leadership score increased from 56.87 \pm 9.01 to 62.07 \pm 8.59 after the program, while that of the control group changed from 57.14 \pm 7.72 to 59.00 \pm 6.81, indicating a statistically significant difference between the two groups ($t = -2.073$, $p = 0.043$). This difference demonstrated a medium effect size (Cohen's $d = 0.54$).

Figure 3 comprises three separate figures that illustrate the mean differences in the study variables between the experimental and control groups. From the left, the first, second, and third figures indicate disaster response core competencies, problem-solving ability, and self-leadership capacity, respectively. They highlight the changes from pre- to post-intervention for both groups.

4. Discussion

This study aimed to develop a web-based PFA simulation training program for nurses and verify its effectiveness. First, the results showed that the disaster response core competencies of the experimental group were significantly different

from those of the control group. This result is similar to that of a study that confirmed the effectiveness of a PFA curriculum comprising three hours of theory and three hours of practice for participants, including psychiatric and non-psychiatric experts; the participants' disaster mental health competency scores increased significantly [27]. When a large-scale disaster occurs, nurses rush to the site without being fully prepared to provide psychological support [28]. However, if nurses do not have the capacity for PFA, their confidence may decrease; they may become exhausted [27, 29] and experience secondary trauma [30]. For nurses to maintain their expertise and competency, a web-based education program that allows repetitive education and has relatively fewer time and space constraints can be helpful.

Second, the problem-solving processes of the experimental group showed a significant difference compared with that of the control group. This is consistent with a study that showed that problem-solving skills can be improved through critical thinking during PFA training [31]. Disaster situations require various problem-solving processes, but workers deployed to disaster sites lack the required critical thinking, organizational skills, and problem-solving skills and are insufficiently prepared [32]. Previous studies have shown that high-fidelity simulation education is more effective than web-based education for problem-solving processes [33]. However, the activities performed by learners who participate in web-based simulations to solve problems have a practical effect in improving problem-solving skills [34] and are recommended for education in fields where face-to-face education is difficult or dangerous.

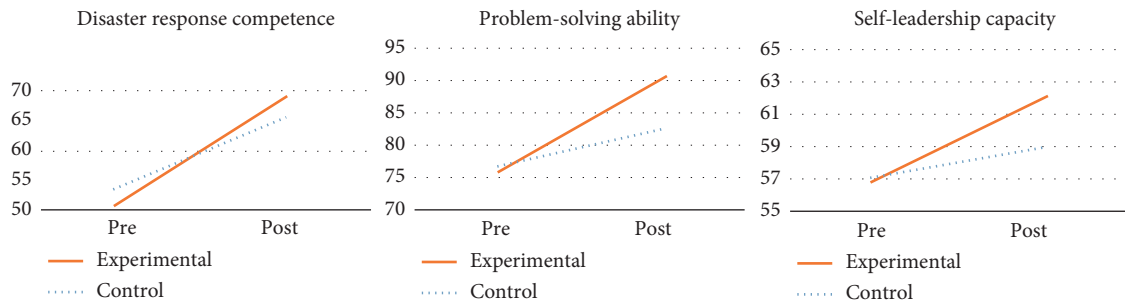


FIGURE 3: Mean differences in the study variables.

Hence, web-based training programs are needed and must be encouraged.

Third, the study results confirmed that the experimental group exhibited improved self-leadership. This finding is similar to previous studies that have reported that simulation education improves learners' self-leadership [35, 36]. Self-leadership is important for nurses at disaster sites to manage crises and work with team members and organizations [37]. A study analyzing the effects of PFA training on teamwork found that self-leadership influences safe behavior in disaster situations and helps both oneself and the organization by performing self-directed activities [38]. Although there are limited studies confirming improvement in self-leadership through web-based simulation education, which restricts direct comparisons, previous research provides some supportive evidence. For instance, a study on high-fidelity simulation education for high-risk maternity care reported improvements in students' self-leadership [35]. Another study comparing high-fidelity simulation education with video-based education found that the simulation education group demonstrated enhanced critical thinking and self-directed learning [36]. This is because simulation-based education, which includes an active problem exploration process, is more effective in improving self-leadership compared with passive education [36].

The results of this study confirmed that nurses' core disaster response competencies, problem-solving processes, and self-leadership improved after web-based PFA simulation training. They also confirm that the web-based PFA training program developed in this study can be used as educational material for nurses to provide effective PFA. Additionally, this educational program is expected to increase nurses' core disaster response capabilities in disaster situations, help them engage in effective problem-solving processes, and achieve results through a self-directed attitude.

5. Limitations

This study had some limitations. First, as validity was verified through convenience sampling when recruiting research participants, caution is needed when generalizing the research results. Second, the participants in this study included nurses with experience in PFA; therefore, the possibility that the effect of previous training may have influenced the results of this study cannot be ruled out. Third, a single researcher applied and evaluated the intervention, which may have introduced

potential biases. Finally, the study's findings may not be widely applicable to all nurses or other healthcare professionals, as the sample was limited to a specific group. Future research should include a more diverse sample to improve the generalizability of the results.

6. Conclusions

This study developed a PFA training program in the form of web-based simulations. The training program reflects the work characteristics of nurses, thereby allowing learners to participate regardless of time and place and enabling repetitive education. The program provides educational opportunities for nurses to become more confident when providing psychological support to disaster-affected individuals. Nurses are expected to ultimately be trained as key practitioners who not only provide disaster psychological support but also contribute to improving the capacity for it.

7. Implication for Nurses' Management

The educational program developed in this study has the advantage of enabling repeated education for nurses regardless of time and place. Compared with existing PFA training, theory and practical training may be possible in a relatively shorter period of time, thus motivating learning and meeting the training needs of nurses. This increase in educational opportunities can increase nurses' confidence in providing psychological support to disaster victims. Thus, nurses are expected to ultimately be trained as key practitioners in and contribute to improving the capacity for disaster psychological support.

Data Availability

The data of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Eun-Joo Choi was responsible for conceptualization, data curation, formal analysis, methodology, original draft preparation, and visualization. Yun-Jung Choi was

responsible for conceptualization, funding acquisition, methodology, project administration, supervision, and review and editing.

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Research Article

Development and Implementation of a Multidimensional Narrative Support System for Emergency Nurses: An Action Research

Hairong Yu ¹, Yue Deng ², and Li Gui ¹

¹School of Nursing, Naval Medical University (Second Military Medical University), Shanghai 200433, China

²Basic Medical Department, Naval Medical University (Second Military Medical University), Shanghai 200433, China

Correspondence should be addressed to Li Gui; guili2000@qq.com

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Background. Emergency nurses may experience various fatiguing duties and suffer more pressure, so it is necessary to promote their professional or work-related quality of life, especially during tough periods. **Aim.** To describe the development of the multidimensional narrative support system and explore its effectiveness and feasibility among emergency nurses. **Design.** An action research was conducted in Shanghai, China, from 2022 to 2023. **Methods.** Two cycles of action research were adopted in the emergency departments of two tertiary general hospitals in Shanghai, China. A total of 20 and 13 emergency nurses from different posts participated in each cycle. Multiple methods and tools, such as validated instruments, self-designed questionnaires, and individual and focus group interviews, were used to collect short- and long-term data. The EQUATOR guidelines on reporting action research were used as the guideline for this study. **Results.** The multidimensional narrative support system was gradually modified to promote its feasibility. Involved emergency nurses actively participated in different activities and proposed relatively positive and satisfying remarks. Quantitative data showed the significantly instant or long-lasting improvements in emergency nurses' professional and work-related quality of life, as well as their self-compassion, and perceived social support. Various categories were summarized about the participants' experiences, perceived long-term effects, and suggestions on the multidimensional narrative support system. **Conclusion.** The multidimensional narrative support system integrates narrative methods and psychological activities and provides multidimensional support for emergency nurses. In spite of various challenges, the system shows good feasibility and significant influences on emergency nurses' well-being and quality of life. **Implications for Nursing Management.** The multidimensional narrative support system may action as a novel intervention for the overall improvements of clinical emergency nurses, which can be recommended to other populations with targeted modifications and training, so as to achieve good generalization in different departments.

1. Introduction

The emergency department is a stressful working environment where nurses may experience physically and psychologically fatiguing duties and suffer more time pressure [1]. Even well clinically trained, emergency nurses also admitted difficulties in interpersonal relationships, high level of responsibility, and absence of feedback for work [2]. In recent years of COVID-19, emergency nurses were directly involved in the pandemic, which made them susceptible to infection and higher levels of stress [3]. Therefore,

emergency nurses may be at risk of negative experiences and emotions and report low levels of professional or work-related quality of life [3, 4].

Professional quality of life is a general construct and involves positive and negative aspects of work life, including compassion satisfaction, compassion fatigue, and burnout [5]. Professional quality of life may not only influence nurses' job performance but also affect their physical and mental health [6, 7]. Work-related quality of life refers to the quality of experience and condition of life as people interact in the employee-employer relationship [8], which was

revealed to correlate with individual's physical and emotional wellbeing, the quality of services, and outcomes related to patients [9]. Consequently, it is necessary for nursing researchers and managers to promote emergency nurses' professional or work-related quality of life, especially in the context of tough periods.

In recent years, various interventions and programs have been developed for nurses to achieve their overall well-being. The Compassion Fatigue Resiliency Program is a structured, comprehensive training program to prevent compassion fatigue and improve resilience, which has been implemented among different populations [10, 11]. Pehlivan and Güner [10] designed a randomized controlled trial with a large sample of oncology-haematology nurses and found that compassion satisfaction scores of nurses participating in this program were significantly higher than those who did not. The mindfulness-based stress reduction (MBSR) incorporates meditation, body and breath awareness, and mind-body practices, and various studies revealed that MBSR was effective to manage stress, enhance resilience and compassion satisfaction, and reduce burnout [12, 13]. Considering the time commitment of traditional MBSR, a 3-minute mindfulness intervention was explored with 3 times of breathing exercise per day over 4 weeks, demonstrating significant reductions in compassion fatigue [14], which proved the efficacy of small MBSR on reducing the physiological stress of nurses [12]. Inspired by the above-mentioned activities, Fu et al. [15] developed an educational program integrating compassion fatigue resiliency, mindfulness respiration, and relatives and friends' support, which had short- and medium-term positive effects on nurses' professional quality of life, as well as physical and mental health. Considering the significance of compassion in nursing profession, McVicar et al. [16] developed a compassionate mind model-based curriculum and found that the 12-month course for health visiting students might reduce their fears of compassion, as well as compassion fatigue.

In addition to the psychological interventions, some physical relaxations and herb therapies were also used for promoting nurses' professional quality of life. The progressive muscle relaxation exercises were intervened for nurse managers, and these exercises over 8 weeks were revealed to significantly decrease their levels of compassion fatigue and burnout [17]. Considering the effects of patchouli oil inhalation on reducing healthy adults' stress and sympathetic nerve activity, Shin et al. [18] designed a randomized controlled trial to investigate the effects of patchouli inhalation, which reported reduced levels of stress and increased compassion satisfaction among emergency nurses.

During the COVID-19 pandemic, a randomized controlled experimental study was carried out to investigate the effects of motivational messages sent to emergency nurses for 21 days, and higher job satisfaction and communication skills and lower compassion fatigue were reported [19]. A 12-week intervention of structured debriefing sessions was explored among trauma health care professionals experiencing patient death, and three questions were asked at every

debriefing around the relationship-based care model [20]. Besides using storytelling or narrative alone to address psychosocial stress in health care professionals, expressive arts interventions are gaining their popularity and were found to have more favorable outcomes [21]. Phillips et al. [22] combined storytelling, reflective writing, music, and psychoeducation to aid oncology nurses on awareness and expression of work-related emotions and indicated that the storytelling through music was feasible and acceptable to address work-related emotions and psychosocial stress.

This study focused on those individual, work-related, and perceived supportive factors of emergency nurses' professional quality of life, which were reported in the hierarchical multiple regression and path analysis models [7, 23] and took advantage of narrative or storytelling to develop the multidimensional narrative support system (MNSS) from the perspectives of individual, expert, and colleague, aiming to improve emergency nurses' professional and work-related wellbeing. To make the MNSS theoretically solid, several relevant models or theories were referenced as the theoretical bases of this study.

Reflective writing is a process of personal and creative writing for reflection on patient care and socialization into medicine [24]. Shapiro et al. [24] put forward its conceptual model, in which the first phase is individual and solitary writing, requiring writers' personal voice, imagination, creativity and reflection, as well as the loss of certainty and authority. During the writing, writers should also recognize and respond to those emotions triggered in patient care [24]. The second phase in the model is small-group reading and discussion, which could lead to the acknowledgement of vulnerability and risk-taking for the writers, and the exercise in witness and mindfulness for the listeners [24]. The two processes may contribute to practitioners' professional development and well-being, together with improved patient care [24]. In view of above-mentioned applicable elements and goals, the reflective writing model was selected to design the primary steps of the MNSS.

Expressive writing is an individual-focused intervention, which aims to promote emotional expression during adaptation to stressful situations, and consequently improves overall health from the emotional, social, biological, and cognitive levels [25]. In the standard protocol of expressive writing, participants can focus on their deepest thoughts and feelings about a negative life experience that they choose and write for 15 to 20 min for several sessions over a few days [26]. Although the writings were usually brief exercises over a limited period, the process definitely invited people to think about their emotions and lives in general. Relatively loose and vague requirements on expressive writing times and intervals present good suitability to guide the writing phase of the MNSS. These features may provide emergency nurses with relaxing atmosphere to express their emotions freely and help to heal their ailments [25, 26].

This study aimed to adopt the action research design to develop and refine the MNSS and further explore its effectiveness and feasibility. Research questions of this study were as follows: how was the process of MNSS developed and refined by two cycles of action research? What effects

did the MNSS have on emergency nurses? What were the experiences of emergency nurses who participated in the MNSS?

2. Materials and Methods

2.1. Design. The mixed-method action research was used to develop and implement the MNSS, as well as explore its effects among emergency nurses. Action research can be used to describe and explain social situations while implementing a change intervention aimed at improvement [27, 28]. Cyclical activities including planning, acting, observing, and reflecting were conducted for two rounds exactly from July, 2022, to February, 2023, in this study. The observation and reflection phases helped to develop new initiatives and address the knowledge-action gap [29]. Enhancing the QUALity and Transparency Of health Research (EQUATOR) guidelines on best practice in reporting action research was used as the guideline for this study [30]. Ethical approval was obtained from the institutional review board of the university.

2.2. Settings and Participants. This study was performed in the emergency departments of two tertiary general hospitals in Shanghai City, China. The emergency departments consist of multiple sections and provide comprehensive emergency patient care. Nurses in the emergency departments undertake the posts in the resuscitation room, infusion room, intensive care unit, observation room, and precheck and triage table, etc. Two sampling strategies of purposive and convenient sampling were used for each research cycle. The eligible criterion was the nurses working in the emergency departments for at least one year. After the lecture on “*Emotion Management and Narrative Writing*” and the introduction of MNSS for nurses in the emergency department, eligible nurses were invited by nursing managers for participation. In the first cycle, the recommendations of nurse managers were referenced to select participants and then the participants completed the pre-intervention survey. In the second cycle, the sequence of recruitment and preintervention survey was changed, and those nurses reporting the score of compassion fatigue ≥ 2.5 in the survey were invited by the nursing manager as potential participants.

2.3. Research Team. The research team consisted of nursing researchers and assistants, nurse managers, and psychologists. The researchers and assistants were responsible for the whole process of developing and applying the MNSS, as well as assigning the tasks to other team members. Nurse managers mainly assisted the recruitment of participants and the time schedule of activities. The psychologists participated in and organized the group training.

2.4. Development and Application of MNSS

2.4.1. Planning and Development. Considering the relevant factors of professional quality of life among emergency

nurses, such as those negative individual experiences, the levels of working stress, self-compassion, and perceived social support [7, 23], the above-mentioned conceptual model of reflective writing and the method of expressive writing were utilized to develop the MNSS. Consequently, the draft of MNSS was developed with the aims to develop emergency nurses’ self-compassion, improve their professional and work-related quality of life, and gain organizational support. The multidimensional activities in the draft included five procedures over a period of 4 weeks, which were lecture, narrative writing (individual dimension), group discussion (colleague dimension), interview analysis (expert dimension), and group training. An expert meeting was organized to revise the draft, and 8 nursing experts with the background of nursing humanities, nursing management, and emergency and critical care nursing were invited to discuss the rationality and feasibility of the draft. The 90-minute recording of the expert meeting was transcribed literally and then summarized into the following suggestions on multidimensional activities:

- (1) The lecture should face all emergency nurses and serve as an opportunity for professional learning.
- (2) The topic of writing should be identified, while the time of writing should not be required.
- (3) The literary level of writing is not of high significance, while the key elements of narration should be involved.
- (4) Interviews should be combined with writing, and the research team should have the ability to reconstruct and reply to the writing from a third perspective.
- (5) The period of 4 weeks may be too tight, and the period should be extended.

The above suggestions were fully considered to revise the draft MNSS. The modified activities in the first-cycle action research contained five steps, which were narrative training for nursing managers, lecture for emergency nurses (expert dimension), narrative writings and interviews (individual and expert dimensions), story rewriting and sharing (individual, colleague and expert dimensions), and group training and discussion (individual, colleague, and expert dimensions).

2.4.2. Application and Improvements. The first-cycle application of the MNSS started in the first season of 2022. The narrative training and the first two lectures for emergency nurses were held in February, 2022. Owing to the outbreak of COVID-19 in Shanghai, the first cycle was postponed to July, 2022. Considering the COVID-19 prevention and control policies, the left lectures and all individual interviews were adjusted to online forms. Moreover, due to high working intensity and difficult shift scheduling in the clinical practice, participants were not forced to take part in the activities of story sharing and group training. The details of the MNSS application in the first cycle are demonstrated in the Table 1. Based on the reflection of the first cycle, several

TABLE 1: Details of the activities in the two cycles of MNSS.

Step	First cycle		Second cycle	
	Activity	Details	Activity	Details
First step	Narrative training for nursing managers	Participants: nursing managers	Others	Others
		<p>Contents:</p> <p>(i) Introduction of MNSS</p> <p>(ii) Learning key skills of narrative nursing</p> <p>(iii) Arrangement of research tasks</p>	<p>Date: 2022.02</p> <p>Duration: about 180 min</p>	<p>Topic: emotion management and narrative writing</p> <p>Contents:</p> <p>(i) Emotions and compassion fatigue</p> <p>(ii) Emotion regulation and narrative writing</p> <p>(iii) Research introduction and recruitment</p> <p>Date: 2022.11</p> <p>Frequency/duration: 1 time/45 min</p> <p>Form: online lecture</p>
Second step	Lectures for emergency nurses	Topic: emotion management and narrative writing	Others	Others
		<p>Contents:</p> <p>(i) Emotions and compassion fatigue</p> <p>(ii) Emotion regulation and narrative writing</p> <p>(iii) Research introduction and recruitment</p>	<p>Date: 2022.02/07</p> <p>Frequency/duration: 4 times/45 min for each</p> <p>Form: two offline and two online lectures</p>	<p>Participants: 13 participants completed writing and interview</p> <p>Topic of writing: an event that triggered your compassion fatigue in previous work, including your experiences and coping methods, as well as the attributions, and outcomes of the event</p> <p>Date: 2022.11–2023.01</p> <p>Form: online interviews</p> <p>Interview: to clarify the characters, scenes, plots, emotions, purposes, and meanings of the event; to provide support by listening, encouraging, questioning, and externalizing</p>
Third step	Narrative writings and interviews	Participants: 19 participants finished two writings; 20 completed two interviews	Others	Others
		<p>Topic of 1st writing: an event that triggered your compassion fatigue in previous work</p> <p>1st interview: to clarify the characters, scenes, plots, emotions, purposes, and meanings of the event</p> <p>Topic of 2nd writing: analysis of the attributions, outcomes, and coping methods of the event</p> <p>2nd interview: To trigger reflection and provide support by listening, encouraging, questioning, and externalizing; to collect evaluations and suggestions</p>	<p>Date: 2022.07–09</p> <p>Form: online interviews</p>	<p>Participants: researchers</p> <p>Activity: To analyze the writings and interviews, and rewrite the event from the researchers' perspective; 13 stories were rewritten</p> <p>Participants: 11 participants, nursing researchers, assistant, manager</p> <p>Contents:</p> <p>(i) Five participants voluntarily shared their own rewritten stories</p> <p>(ii) Other participants communicated their feelings and relevant experiences</p> <p>(iii) All participants completed a survey on previous activities</p> <p>Date: 2023.01</p> <p>Duration: about 100 min</p> <p>Form: online activity</p>

TABLE 1: Continued.

Step	Activity	First cycle Details	Others	Activity	Second cycle Details	Others
Fourth step	Story rewriting	Participants: researchers Activity: to analyze the writings and interviews and rewrite the event from the researchers' perspective; 20 stories were rewritten	Date: 2022.08-09	Reflective writing	Participants: 10 participants completed the writing Topic of writing: reflection on the event and your experiences of compassion fatigue based on previous interviews, rewrote stories, and sharing experiences	Date: 2023.01-02
		Participants: 11 participants, nursing researchers, assistant, managers Contents: (i) Five participants voluntarily shared their own rewritten stories (ii) Other participants communicated their feelings and relevant experiences (iii) All participants completed a survey on previous activities	Date: 2022.09 Duration: about 100 min Form: offline activity			
Fifth step	Group training and discussion	Participants: 9 participants, nursing researchers and assistant, and psychologists Topic: team building activity/group discussion and summary Objectives: (i) To relieve work stress and negative emotions (ii) To activate the enthusiasm of teamwork (iii) To master effective communication skills (iv) To obtain support from the group and peers (v) To enhance the ability of self-regulation (vi) To discuss the experiences of and suggestions on the MNSS	Date: 2022.10 Duration: about 75 min Offline activity: floor curling	Group training and discussion	Participants: 7 participants, nursing researchers and assistant, and psychologists Topic: team building activity/group discussion and summary Objectives: (i) To relieve work stress and negative emotions (ii) To obtain support from the group and peers (iii) To discuss the experiences of and suggestions on the MNSS	Date: 2023.02 Duration: about 90 min Offline activity: "talking about yourself"
		Participants: 11 participants, nursing researchers, assistant, managers Contents: (i) Five participants voluntarily shared their own rewritten stories (ii) Other participants communicated their feelings and relevant experiences (iii) All participants completed a survey on previous activities	Date: 2022.09 Duration: about 100 min Form: offline activity			

improvements on the MNSS were summarized and implemented in the second cycle.

- (1) Considering the difficulty in training nursing managers to analyze and rewrite stories in a professional narrative way, their narrative training can be canceled.
- (2) The preintervention survey should be conducted before the recruitment, and those nurses with a higher level of compassion fatigue should be enrolled.
- (3) Writing topics should be covered in one time, so as to make the writing coherent and compress the research time. One individual writing and one interview can be considered.
- (4) The topic of writing should be more focused, and a second writing with the topic of reflection can be added after story sharing.

The revised second-cycle MNSS consisted of five steps (lecture for emergency nurses, narrative writing and interview, story rewriting and sharing, reflective writing, and group training and discussion), and the details are also reported in the Table 1. Because of the different organizational structure in the second emergency department, the introduction lecture was held only once. The frequency of narrative writing and interview was reduced to improve the integrity and efficiency. Rewriting of the participants' stories required researchers' deep analysis of those writings and interviews, which were directed by narrative competence, defined as the skills required to recognize, absorb, interpret, and be moved by the stories one hears or reads [31]. When rewriting stories, the researchers combined textual, creative, and affective skills, following the procedures of identifying the original story's structure, adopting multiple perspectives, imagining interpretations and multiple endings, and entering the story's mood [31]. The process of story sharing could arouse mutual understanding between the individuals and colleagues and might function as a kind of peer support. The reflective writing provided participants an opportunity for reflection and summary. Different activities of group training organized by psychologists were attempted in two cycles to explore probably different effects.

2.5. Data Collection. A mixed-method data collection was performed in this study, and various data were collected prior, during, and after the MNSS using quantitative measures and qualitative methods, to facilitate the observation and reflection phases of the action research. The surveys on the effects of MNSS were conducted before (T1) and immediately after (T2) the application of MNSS with 3 instruments in the first cycle and 4 instruments in the second cycle. For better understanding of the long-term effects of the MNSS, the surveys were also implemented about 1 to 1.5 years after the MNSS (T3) concurrently among those participants in both cycles. To understand participants' evaluations on the MNSS and their perceived self-improvements, self-designed questionnaires were

administered in both cycles. Meanwhile, qualitative data on participants' perceived benefits and difficulties, as well as suggestions on the MNSS, were collected through overphone interviews, group discussions, and open-ended survey questions from the participants.

The mixed-method design adopted a concurrent data analysis process, in which both quantitative and qualitative data were integrated during the analytic stage to provide a comprehensive explanation on a specific phenomenon, that was the effectiveness and feasibility of the MNSS [32]. The logical relations between the qualitative and quantitative methods in this study assumed to be complementary, where two parts of the results supplemented each other. It was supposed that those qualitative results might support and complement the quantitative findings of the MNSS's effectiveness, as well as provide sufficient feedback on the MNSS required by the action research. Consequently, the triangulation process in this study might promote complementary results from qualitative and quantitative data [32], so as to enhance the overall validity of the findings.

2.6. Measurements

2.6.1. Professional Quality of Life. The Professional Quality of Life Scale was developed by Stamm [5]. Shen et al. [33] developed and validated the Chinese version of the scale, including a total of 25 items for three independent dimensions of compassion satisfaction, compassion fatigue, and burnout. Items were rated on a 5-point Likert response set, with two items reversely scored. A higher score indicated a higher level of the dimension. Cronbach's α coefficients of the dimensions ranged from 0.758 to 0.821.

2.6.2. Work-Related Quality of Life. Van Laar et al. [34] developed the Work-Related Quality of Life Scale, and the 2nd edition of the scale was translated into Chinese and modified by Shao et al. [35]. The Chinese version scale consists of 7 subscales and 33 items rated on a 5-point Likert response set. The items of the Stress at Work subscale need reverse scoring to calculate the total score. A higher score indicates higher work-related quality of life. Cronbach's α coefficient of the Chinese scale was 0.939.

2.6.3. Self-Compassion. The self-compassion scale was developed by Neff [36], and the Chinese version was validated by Chen et al. [37]. This scale consists of 26 items, contributing to six subscales. Three subscales represent positive aspects of self-compassion, while the other three assess opposite states. Items are rated on a 5-point Likert response set. The opposite items need reverse scoring to calculate the total score, and a higher score indicates higher self-compassion. Cronbach's α coefficient of the Chinese scale was 0.84.

2.6.4. Social Support. The multidimensional scale of perceived social support was developed by Zimet et al. [38]. The Chinese version scale was translated and validated by Huang

et al. [39], measuring subjectively perceived support from family, friends, and significant others (e.g., leaders and colleagues). Items are rated on a 7-point Likert response set. A higher score indicates higher perceived social support.

2.6.5. Evaluations and Perceived Benefits of MNSS. The self-designed questionnaires were used to understand participants' evaluations on the MNSS and their perceived self-improvements. The number of evaluation items on the whole MNSS and rewrote stories was 12 and 6; the numbers of self-improvement items on the whole MNSS and activities of writing, story sharing, and group training were 9, 8, 12, and 7, respectively.

2.6.6. Semistructured Interviews and Open-Ended Questions. Semistructured interviews were conducted with the participants, and the interview outline was designed to guide them to reflect on their experiences in the MNSS and to provide improvement suggestions. All interviews were conducted and recorded with the participants' consent by the researchers. Moreover, open-ended questions were used in the T3 survey to explore participants' perceived long-term effects, targeting on associated changes in nursing work and personal life in the past year.

2.7. Data Analysis. IBM SPSS 22.0 was used for statistical analysis of the collected data. Descriptive statistics were calculated to examine continuous variables ($\bar{X} \pm S$) and categorical factors [n (%)]. Repeated-measure ANOVA was used to compare the scores of involved variables across timepoints (T1, T2, and T3), so as to examine the effectiveness of the MNSS. Assumption of sphericity was tested using Mauchly's test. For those data violated sphericity, the Greenhouse–Geisser correction was adopted. Pairwise comparisons used Bonferroni corrections. The Wilcoxon signed-rank test was used to analyze the differences between the short- and long-term perceived improvements among the participants in each cycle. Statistical significance was revealed when p values were less than 0.05. Those data collected in the interviews and open-ended questions were analyzed using the Colaizzi seven-step content analysis, including the steps of familiarization, identification of meaningful statements, construction of meanings, clustering of themes, detailed description, development of basic structure, and verification of basic structure [40].

3. Results

3.1. Sample Characteristics. In both cycles, emergency nurses with different working posts and years were purposively selected to maximize the diversity and comprehensiveness of the results. In the first cycle, a total of 20 nurses agreed to participate in the MNSS. Over half (12, 60.0%) of them had the professional title of nurse, and 8 (40.0%) were senior nurses. Seven participants (35.0%) had working experiences of 1 to 3 years, seven (35.0%) with 4 to

6 years, and six (30.0%) with over 7 years. Their working posts included precheck and triage (2, 10.0%), resuscitation (2, 10.0%), infusion (9, 45.0%), intensive care (3, 15.0%), observation (3, 15.0%), and injection (1, 5.0%). Owing to the dimission of one participant, only 19 participants of the first cycle completed the long-term T3 survey. In the second cycle, 14 nurses with the score of compassion fatigue ≥ 2.5 agreed to participate, while one nurse dropped out owing to turnover. A total of 13 nurses participated in the MNSS and completed the surveys across three timepoints. Seven (53.8%) participants were nurses, 5 (38.5%) were senior nurses, and 1 (7.7%) was a supervisor nurse. Seven participants (53.8%) had working experiences of 1 to 3 years, four (30.8%) with 4 to 6 years, and two (15.4%) with over 7 years. Their working posts included precheck and triage (1, 7.7%), resuscitation (8, 61.5%), infusion (2, 15.4%), intensive care (1, 7.7%), and observation (1, 7.7%).

3.2. Descriptions of Writings and Interviews. In the first cycle, 19 participants completed two writings, with the average word counts to be (677.68 ± 308.16) and (391.95 ± 203.74) . All 20 participants underwent two interviews, and the average interview time was (24.95 ± 5.09) min and (24.60 ± 7.45) min. Researchers rewrote one story for each of the 20 participants, with the average word count of (2045.65 ± 499.46) . In the second cycle, 13 participants completed the writing, with the average word count of (660.77 ± 282.11) , and participated in the interview, with the average interview time of (25.00 ± 5.80) min. Researchers also rewrote one story for each participant, with the average word count of (1686.46 ± 453.94) . Ten participants completed the reflective writing, and the average word counts were (336.20 ± 129.89) .

3.3. Comparison of Measurement Variables. As reported in Table 2, the scores of self-compassion among the participants increased significantly across the three timepoints in both cycles, and the T3 scores were significantly higher than those T1 scores ($P = 0.024, 0.001$). In the second cycle, the scores of burnout among the participants decreased significantly across the three timepoints, while the T3 scores of burnout and compassion fatigue were both significantly lower than their T1 scores ($P = 0.008, 0.014$); the scores of work-related quality of life and perceived social support among the participants changed significantly across the three timepoints, and the T1 score of work-related quality of life was significantly lower than those T2 and T3 scores ($P = 0.027, 0.008$); besides, the T1 score of perceived social support was significantly lower than those T2 and T3 scores ($P < 0.001, P = 0.002$), and the T2 score was significantly higher than the T3 score ($P = 0.038$).

3.4. Evaluations and Perceived Benefits. Participants reported their evaluations on the MNSS (Table 3), as well as their perceived self-improvements (Table 4). The numbers of participants choosing specific item levels were reported. The long-term perceived improvements among the participants

TABLE 2: Results of repeated measures analysis in the two cycles ($\bar{X} \pm S$).

Cycle	Time points	Compassion satisfaction	Burnout	Compassion fatigue	Self-compassion	Work-related quality of life	Perceived social support
First cycle ($n_1 = 19$)	T1: pre-MNSS	3.43 ± 0.735	2.49 ± 0.584	2.44 ± 0.478	3.28 ± 0.382	3.42 ± 0.628	—
	T2: post-MNSS	3.67 ± 0.844	2.26 ± 0.639	2.24 ± 0.492	3.37 ± 0.357	3.59 ± 0.569	—
	T3: about 1–1.5 years after MNSS	3.66 ± 0.795	2.19 ± 0.535	2.24 ± 0.526	3.57 ± 0.455 ^a	3.72 ± 0.620	—
	<i>F</i>	1.201	2.164	2.017	3.663	2.629	—
	<i>P</i>	0.302	0.130	0.148	0.036	0.086	—
Second cycle ($n_2 = 13$)	T1: pre-MNSS	3.44 ± 0.590	2.96 ± 0.561	2.83 ± 0.300	3.17 ± 0.312	3.26 ± 0.721	4.70 ± 1.085
	T2: post-MNSS	3.85 ± 0.795	2.51 ± 0.588	2.74 ± 0.868	3.55 ± 0.522	3.97 ± 0.683 ^b	6.22 ± 0.864 ^b
	T3: about 1–1.5 years after MNSS	3.65 ± 0.620	2.26 ± 0.735 ^a	2.22 ± 0.648 ^a	3.69 ± 0.419 ^a	3.80 ± 0.569 ^a	5.66 ± 0.977 ^{ac}
	<i>F</i>	2.098	5.861	3.449	7.786	8.532	26.818
	<i>P</i>	0.145	0.008	0.074	0.002	0.002	0.000

^aScore at T3 was significantly different from that at T1 ($P < 0.05$). ^bScore at T2 was significantly different from that at T1 ($P < 0.05$). ^cScore at T3 was significantly different from that at T2 ($P < 0.05$).

TABLE 3: Evaluations on the MNSS in two cycles.

Activity	Items	Evaluation	1 st cycle ($n_1 = 20$)		2 nd cycle ($n_2 = 13$)	
			Levels	n	Levels	n
Whole MNSS	(i) Research design was scientific and reasonable			18		12
	(ii) You could understand the research purpose and theme			18		12
	(iii) Research could arouse your interests and activity			18		12
	(iv) Arrangement of research activities was logical			19		13
	(v) Arrangement of research activities showed the characteristics of narration			18		12
	(vi) Research activities could reflect the management and support from three dimensions			18		13
	(vii) Researchers showed high abilities of organization and implementation		Comparatively/completely agree			
	(viii) Research atmosphere was relaxing and pleasant, without discomfort			18		12
	(ix) Arrangement of research activities was compact, and efficiency was high			18		13
	(x) Research's overall time span (about 3 months) was relatively long			16		12
	(xi) It was of high pressure to participate in research in rest time			7		4
	(xii) You were satisfied with your performance in the research			5		6
Story rewriting	(i) How did you think the rewrote story fit your original story?			18		10
	(ii) Rewrote story was an important gain for your participation in this study		Comparatively/completely fit			
	(iii) Reading rewrote story could deepen your understanding of compassion fatigue			19		13
	(iii) Rewrote story could reflect the researchers' understanding on you		Comparatively/completely agree			
	(i) The degree to which you approved of the rewrote story from the researcher			16		11
	(i) How were you satisfied with your rewrote story?		Comparatively/completely agree			
		Comparatively/completely approve				
		Comparatively/completely satisfied				
			17		13	
			17		12	

TABLE 4: Perceived self-improvements in the MNSS and activities in two cycles.

Self-improvements	First cycle				Second cycle						
	1 st writing (n = 19)	2 nd writing (n = 19)	Listening and sharing (n = 11)	Group training (n = 9)	Whole NMSS (short-term) (n = 20)	Whole NMSS (long-term) (n = 19)	Writing (n = 13)	Listening and sharing (n = 11)	Group training (n = 7)	Whole NMSS (short-term) (n = 13)	Whole NMSS (long-term) (n = 13)
Improving writing skills	14	15	—	—	—	—	10	—	—	—	—
Improving expression skills	—	—	10	—	—	—	—	10	—	—	—
Improving listening skills	—	—	10	—	—	—	—	11	—	—	—
Improving levels of empathy	—	—	10	—	—	—	—	11	—	—	—
Improving professional identity and satisfaction	13	15	10	—	18	12	11	10	—	13	9
Improving emotional management skills	17	16	10	8	16	14	12	11	7	13	11
Improving skills and levels of self-compassion	16	14	10	8	18	12	10	11	7	12	9
Improving interpersonal skills	—	—	10	—	18	14	—	10	—	12	9
Improving communication skills with colleagues	—	—	—	8	—	—	—	—	7	—	—
Improving team collaboration ability	—	—	—	8	—	—	—	—	7	—	—
Improving level of perceived and received support	—	—	—	—	18	12	—	—	—	12	9
Relieving negative emotions at work	15	14	10	8	16	12	11	11	7	12	9
Reducing level of compassion fatigue	13	14	9	7	18	11	11	10	7	11	9
Reducing job burnout	14	14	10	—	16	10	11	11	—	12	6
Relieving working stress	—	—	—	8	—	—	—	—	7	—	—
Gaining resonance and support from colleagues	—	—	10	—	—	—	—	11	—	—	—
Achieving self-reflection on work	18	18	10	—	19	14	12	11	—	13	6

TABLE 5: Qualitative data on the experiences of participants.

Activity	Category	Quotations
Relaxing opportunity to talk and express emotions	Beginning to focus and reflect on own emotions	<p>“The interviews were relaxing and good. I could relieve my feelings in this process” - participant 1</p> <p>“In the past, I would not pay attention to my emotions. When I wrote my story, I needed to notice the change of my emotions... These could help to clarify my emotions at work and in life” - participant 4</p>
	<p>Helping to relieve stress at work</p> <p>Feeling being healed and valued</p>	<p>“The interviews could effectively relieve the pressure at work” - participant 22</p> <p>“When I shared my story, I could feel that I was understood, so I would like to continue and express my emotions... I could get good feedback, and the process was really healing.” - participant 5</p>
Finding methods to improve future work	High-quality and enlightening rewrote stories	<p>“I could sort things out step by step. This method of writing can be used in my future work to help me identify and solve problems” - participant 7</p>
Rewrote stories and sharing	Gaining more perspectives on events	<p>“The rewrote stories are good and can touch on the key points... The stories can give me a sense of enlightenment” - participant 23</p>
	Helping to guide future work	<p>“After sharing those negative emotions at work, I started to relax myself. I tried to understand others and avoid direct conflicts” - participant 7</p> <p>“I could learn from other colleagues, like how to deal with interpersonal relationships, how to behave well in my work... It was a process of reflection” - participant 9</p>
Group training	Interesting activity to relieve work stress	<p>“The activity was very interesting, and could help me relieve the stress” - participant 11</p>
	Familiar with colleagues and promote team building	<p>“We were not familiar with each other at the beginning. But we cooperated and adjusted ourselves... We behaved like a team and made efforts to achieve the same goal... We had to organize the team quickly and effectively” - participant 10</p>
Whole process	Satisfied with good researchers and colleagues	<p>“The teachers were very responsible and the colleagues were very helpful” - participant 22</p> <p>“I was very satisfied with the system” - participant 25</p>
	<p>Promoting oneself comprehensively</p> <p>Reflection on previous experiences</p>	<p>“The process could promote our expression ability and improve ourselves... Therefore, we can treat the patients better and regulate our emotions” - participant 12</p> <p>“It was opportunity for reflection... If we communicate together, we can find problems that we cannot see, and then we will gather together to discuss” - participant 27</p>

TABLE 6: Qualitative data on perceived long-term effects of participants.

Category	Quotations
Change of mentality and emotions	<i>"I am more optimistic. When I encounter an emergency, I can keep calm"</i> -participant 23
	<i>"Now I feel happier than when I was during the epidemic, and the atmosphere is no longer depressing"</i> -participant 33
Understanding of and passion for nursing work	<i>"I do what I can to complete my own work and help those patients. I believe "don't try to be perfect, but try your best"</i> -participant 30
	<i>"When things happen to me, I become less stubborn. I also gain new motivations for nursing work"</i> -participant 6
"Standing in patients' shoes"	<i>"When the communication with patients is not fluent, I can remind myself to stand in their shoes and be more empathetic"</i> -participant 19
	<i>"The level of my empathy, together with the interpersonal communication ability have been improved"</i> -participant 2
Better coping with personal emotions	<i>"When communicating with patients and families, I pay more attention to my tone and attitude. I can adjust negative emotions quickly, and do not bring bad emotions to other patients"</i> -participant 18
	<i>"Now I can relieve my negative emotions well and don't let those emotions influence me for too long"</i> -participant 23
Cultivation of thinking habits and interests	<i>"I will review my work and life periodically, and develop a clearer plan for my future career and life"</i> -participant 3
	<i>"I can better balance my work and life, and cultivate some interests of my own"</i> -participant 12

of the two cycles were significantly lower than their short-term perceived improvements, respectively ($Z = -2.142$, -2.499 , $p = 0.032$, 0.012).

3.5. Qualitative Data. Those data on the experiences of participants in the MNSS, as well as their perceived long-term effects of the MNSS, were reported in Tables 5 and 6. Table 7 showed the data on suggestions that participants proposed on the MNSS.

4. Discussion

This study adopted the action research process and evaluated the short- and long-term effectiveness of the multidimensional narrative support system (MNSS) on emergency nurses during and after the period of COVID-19. Among those interventions targeting on the nurses' compassion satisfaction, compassion fatigue, and burnout, different outcomes were reported. A 3-minute mindfulness intervention, the 3Rs educational program and those progressive muscle relaxation exercises showed their effects on decreased compassion fatigue and burnout [14, 15, 17]. Short-term inhalation of patchouli oil might reduce emergency nurses' compassion fatigue and increase their compassion satisfaction [18]. Unlike the significant promotion on professional quality of life achieved by the compassionate mind model-based curriculum [16], a 12-week pilot of structured debriefing sessions revealed no significant differences in all three aspects before and after the interventions [20]. The different results in the two cycles of this study might be explained by the characteristics of nursing work in two units, the disparities and diversities of those shared stories, and the psychological activities of group training. Besides, during the second cycle of this action research,

China optimized the COVID-19 control policies in a 10-point notice released on December, 2022. With the adjustment of policies, the rapidly increasing number of infected patients imposed additional working challenges on emergency nurses. Future research can also explore the specific effects of different activities on the participants.

Self-compassion can be regarded as "the support toward oneself when experiencing suffering or pain caused by personal mistakes and inadequacies or external life challenges" [41]. Perceived social support in this study involved those participants' subjectively assessed support from family, friends, as well as leaders and colleagues. Quantitative results proved the short- and long-term effectiveness of MNSS on its promotion of participants' self-support and perceived social support, indicating that those activities in MNSS, such as writing and interviewing, might help emergency nurses take a kinder and less judgmental approach to their sufferings [41], and story sharing and group training could provide them some extent of peer and organizational support. Results of repeated measures showed that work-related quality of life was significantly improved after the MNSS in the second cycle, indicating that the MNSS might function as an effective administrative system for the participants to achieve career growth and contribute to a favorable job environment for emergency nurses [8]. The efficiency of MNSS in the second cycle might be first attributed to the medium level of work-related quality of life before the MNSS and also confirmed its necessity when emergency nurses were exposed to unpredictable changes and stressful situations during the COVID-19 pandemic [4].

Results provided evidence that the novel support system was a scientific and logical approach refined by two cycles of action research. Besides, the MNSS was proved to be feasible and acceptable for emergency nurses, as the high portion of positive evaluations revealed that the participants showed

TABLE 7: Qualitative data of suggestions on the MNSS.

Activity	Category	Quotations
Writing and interviewing	Focusing on a recent event	<p>“If something unhappy happened recently, I could use the methods of writing and interviewing. I need to find a way to express my emotions”-participant 8</p> <p>“The topics of writing should be various and rich”-participant 13</p>
	Providing one or different topics for writing	<p>“We could use a case as the target to trigger the writers’ memory.” Then you may find different reactions during the writing”-participant 10</p>
Listening and sharing	Shortening intervals and times	<p>“The duration for writing and interviewing was a bit long... They should be connected more closely to help me maintain a clear mind”-participant 11</p>
	Adding methods to relieve emotions	<p>“I think the two writings can be combined as one, that is, we can write a coherent writing at one time”-participant 15</p> <p>“When talking about something, I may still have the emotions of anger and excitement. At this time, some methods of relief and regulation should be used”-participant 4</p>
Group training	Providing offline activities to promote passion	<p>“Online and offline activities could be combined. For example, stories can be shared online, which makes it easier for sharing. We can discuss offline to exchange feelings more directly”-participant 28</p>
	Sharing stories with different themes	<p>“Most of the shared stories had the same topic. It might be more meaningful to choose some stories with conflicting views, which could promote exploration”-participant 22</p>
Whole process	Going outside for group activities	<p>“Many types of group activities can be carried out in the park... We can also try those outside activities”-participant 16</p>
	Providing various forms of activities	<p>“The activities could be more various, providing different forms of activities for the participants”-participant 27</p>
Providing chances to achieve immediate communication	Necessary to promote participants’ understanding	<p>“It’s necessary to think how to help the participants have a more open mind to participate in this activity at the beginning, and how to help them have a full understanding”-participant 16</p>
	Better to invite those nurses who are emotional	<p>“Young nurses might have more psychological changes”-participant 12</p> <p>“For those people who cannot relieve themselves, they can write more about these things and analyze the reasons”-participant 16</p>
Providing chances to achieve immediate communication		<p>“If I am angry today, I can write down what happened... People who see it can respond to my writing in a timely manner”-participant 25</p>

strongly agreement on the MNSS. The outbreak of COVID-19 in Shanghai during 2022 imposed profound impact on the whole research. Consequently, the form of interviews, lectures, and sharing were adjusted to online and the time for each activity was relatively flexible considering the working schedules of most participants [22]. This strategy provided a relaxing atmosphere for participants and might not add much stress on them, which appeared to be a critical feature of the MNSS.

Participants' perceived self-improvements and qualitative data also confirmed the short- and long-term effects of MNSS. Their improved communication, reflection, and collaboration skills might facilitate their daily work in emergency departments and function as effective strategies to increase operational efficiency, improve job satisfaction and patient care, and promote comprehensive personality growth [42, 43]. The MNSS also provided a chance for participants to relieve negative emotions at work during the COVID-19 pandemic, which could reduce patient safety risks and improve health care provider well-being [44]. Comparison between participants' perceived short- and long-term self-improvements indicated that the effects of MNSS might fade over time, especially the level of social support revealed in the repeated measurement. Although long-term effects were well documented in this study, involved activities should be carried out regularly with appropriate frequency to better consolidate the effectiveness of MNSS.

After participants finished their writing and interviews, they were surprised by the experiences of healing and changing, which was consistent with the study on the storytelling through music intervention [22]. Participants proposed constructive suggestions on writing, indicating their interest in writing after the intervention. Most participants were satisfied with their rewrote stories and agreed that the rewrote story was a significant gain for them. Rewrote stories played several roles in the MNSS, including appealing for participation, summary of participants' experience, and response and support to participants. The process of organizing, exploring, and making meaning from multiple perspectives might value the context of an individual's experiences, allowing for a deeper exploration of their stories [45]. Some participants stated that they were enlightened by the rewrote stories and thought that the reorganized stories were better than their original ones.

To explore the feasibility and effects of different activities, floor curling and group talking were adopted in group training of each cycle. According to the qualitative results, the game of floor curling showed remarkable effects. Some participants believed it was a new and interesting activity for them and also an opportunity to improve the ability of teamwork. Curling is a kind of team sport that can reveal the importance of effective communication, as athletes must exactly perceive what their teammates say in the game [46]. To achieve better performance, athletes in curling should make correct and fast decisions, support each other, and cope with stress [46], which were similar with the working conditions of emergency nurses. Future MNSS should provide more various and outdoor activities for the participants.

The MNSS also features its comprehensiveness, as various activities were selected and designed from dimensions of individual, colleague, and expert. The writing process is considered as a solitary act, in which each individual must retreat into oneself, contemplate events, and imagine various meanings [24]. Based on each participant's writing, experts in humanistic sciences organized individualized interviews and reconstructed their stories, providing support for participants. During story sharing and group training, participants might feel the support from their colleagues. The peer support is a key element of the MNSS, similar with the peer-support program in which colleagues may understand present stressors more easily and have a great deal of compassion for their peers [47]. Some participants believed that peers' sharing helped them gain more perspectives and understandings and suggested sharing stories with different themes in the future.

4.1. Limitations and Recommendations. Several limitations should be considered in this study. As conducted during the period of COVID-19, some activities of MNSS were restricted to online forms, which might reduce the effects. Future research should explore the feasibility and effectiveness of MNSS featuring multiple face-to-face activities. This study was conducted in two tertiary general hospitals in Shanghai City, which limited its generalizability to other populations of emergency nurses. The MNSS should be promoted to other hospitals of different levels in different cities to test its applicability comprehensively. Modifications are welcomed to develop unique MNSS for different emergency departments and even other populations of clinical nurses. Moreover, competent nursing managers with narrative abilities should be cultivated.

5. Conclusion

This research described the development and implementation of a novel professional support system, the multidimensional narrative support system, for emergency nurses during the period of COVID-19. The five-step system integrated the narrative methods of reflective and expressive writing, as well as diverse psychological activities, and provided multiple support systems from the dimensions of colleagues and experts. The action research design was adopted in this study to modify the MNSS fully considering the participants' experiences and suggestions, which empowered the emergency nurses to refine such a support system for their own overall improvements. Despite the challenges from COVID-19, the MNSS was proved to have good feasibility, providing information about the applicability of this support system for nurses working in emergency departments. The MNSS reported a significant influence on improving emergency nurses' well-being and quality of life, and it could be recommended in more hospitals to benefit more emergency nurses.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' Contributions

Yue Deng is the co-first author of this article.

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Research Article

Development and Validation of the Portuguese Transcultural Nursing Leadership Questionnaire (QLTE-PT)

Gisela Teixeira , Filomena Gaspar , and Pedro Lucas 

Nursing Research Innovation and Development Centre of Lisbon (CIDNUR), Nursing School of Lisbon, Avenida Prof. Egas Moniz, Lisboa 1600-069, Portugal

Correspondence should be addressed to Gisela Teixeira; gteixeira@esel.pt

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Introduction. This study introduces the Portuguese Transcultural Nursing Leadership Questionnaire (QLTE-PT), a pioneering instrument designed to assess leadership behaviours in multicultural nursing work environments, addressing gaps in current leadership assessment tools. **Aim.** This study aimed to develop and validate the Portuguese Transcultural Nursing Leadership Questionnaire (QLTE-PT). **Methods.** It was conducted as a sequential exploratory mixed-method study, integrating DeVellis's steps for instrument development. Items were formulated based on a literature review and a focus group study, and the content validity was evaluated by a panel of experts. A methodological approach involving nurses registered in the Portuguese Order of Nurses with leadership experience in multicultural nursing work environments was employed to further conduct an exploratory and a confirmatory factor analysis to assess the instrument's structure and psychometric properties. **Results.** One hundred forty-five items were initially generated, of which 39 were included in the QLTE-PT following content validity assessment by a panel of experts. EFA revealed a factor structure of 25 items loading on six factors, explaining 64% of the total variance. The overall Cronbach's α coefficient of the questionnaire was 0.90. This six-factor structure was tested by CFA, revealing a final model of 23 items and six factors, with a good quality of adjustment (CFI = 0.980, TLI = 0.976, SRMR = 0.078, and RMSEA = 0.070). Both convergent and discriminant validity were confirmed. **Conclusions.** The QLTE-PT demonstrates good psychometric properties and is suitable for assessing transcultural leadership behaviours of nurse managers and leaders in multicultural nursing work environments. **Implications for Nursing Management.** The QLTE-PT can assist nurse managers to improve their leadership behaviours, promote supportive working environments for their multicultural nursing staff, and improve the quality of care provided to patients from different cultural backgrounds.

1. Introduction

The interconnectedness and interdependence between nations, along with the exchange of people, goods, services, and information, have contributed to cultural diversity in workplaces, communities, and globally. This requires leaders who can guide multinational projects and lead people or groups from different cultural backgrounds in organizations, producing appropriate responses to their customers' needs with different cultures and expectations [1, 2]. Against this backdrop, the concept of transcultural leadership has gained prominence, advocating for the development of people and organizations equipped to address the challenges that arise from globalization, increased competition, and power asymmetries [3].

Defined as the process of articulating, implementing, and nurturing a global cultural vision and creating multicultural synergy [4], transcultural leadership is pivotal in various sectors, including healthcare. Within the nursing discipline, transcultural nursing leadership focuses on the culturally sensitive transformation journey. This involves tailoring behaviours, processes, and products to meet the cultural needs of both nurses and patients, challenging traditional paradigms, and guiding the delivery of culturally congruent care [5]. Such leadership is essential not only for delivering culturally congruent care to patients and achieving optimal health outcomes for all populations [6, 7] but also for effectively managing the challenges of culturally diverse nursing teams [5].

Cultural diversity among patients and healthcare professionals is a current scenario in Portuguese healthcare organizations [8]. Portugal hosts more than half a million of immigrants [9], who face several difficulties when accessing health services, such as discrimination, lack of information and knowledge on how the Portuguese healthcare system works, administrative barriers, and cultural and linguistic barriers that hinder communication with the employees and healthcare professionals of the National Health Service [10]. According to a study developed by Dias et al. [11], a majority of immigrants consider that having been in Portugal for a short time (85.1%), lacking knowledge about legal rights to health access (78.9%), being alone in Portugal (76.9%), having insufficient financial resources (75.6%), existence of complex bureaucratic procedures for health services access (75.2%), language differences (59.8%), absence of interpreters (49.5%), challenges in expressing symptoms and recognizing illness (46.9%), distrust towards health professionals (45.7%), and beliefs, religious, and cultural traditions (27.7%) are factors that condition their access and utilization of health services in Portugal.

In addition, recent data from the Portuguese Order of Nurses *Ordem dos Enfermeiros* [12] reveal that 1348 nurses registered in 2022 were from foreign countries. According to Silva and Fernandes [13], despite the reports of a good welcome, immigrant nurses report challenges and difficulties during their integration in Portugal. These difficulties and challenges are related to the recognition of academic degrees and the differences in roles, skills, autonomy, and hierarchy in professional relationships, working conditions/resources, and language, particularly differences in technical nursing terms between Portugal and their home countries. Foreign nurses in Portugal also identify experiences of discrimination from patients and colleagues and unequal treatment by their managers, such as discrediting their knowledge, exclusion from training, unbalanced work distribution, abuse of power, and no opportunities for professional development, specifically being a team leader or mentoring nursing students [13]. According to Primeau et al. [14], it is important that organizations ensure healthy work environments free of discrimination and with opportunities for this particular group of nurses to achieve their career goals.

The diversity and related challenges in Portuguese healthcare settings highlight the need for a nuanced understanding and effective management of cross-cultural dynamics, accentuating the importance of transcultural nursing leadership. Nurse managers are pivotal in this context, as they are responsible for promoting culturally congruent care to patients from different cultural backgrounds and developing favorable work environments for multicultural nursing teams [15]. The challenges they face in providing better support to their teams and developing effective leadership styles [16], especially when managing nurses from different cultures, are significant. This complexity is a growing concern in Portugal [17–21] and the complexity that cultural diversity adds to these environments must be recognized.

There are no studies or instruments to assess transcultural nursing leadership. The most commonly used tools to assess nursing leadership competencies are the Ambulance Nurse Competence scale, Leadership Practices Inventory, Clinical Leadership Needs Analysis Instrument, Cotter Preceptor Selection Instrument, Performance Evaluation Tool, Leadership and Management Inventory, Advanced Practice Nursing Competency Assessment Instrument, and Kuopio University Hospital Transformational Leadership Scale [22]. Given the absence of instruments assessing transcultural nursing leadership in multicultural settings, i.e., in healthcare settings where nurses from different cultural backgrounds work and where care is provided to culturally and linguistically diverse patients, this study aimed to do the following:

- (1) Develop the Portuguese Transcultural Nursing Leadership Questionnaire (QLTE-PT) specifically tailored to assess nurse leaders and managers' leadership behaviours in multicultural nursing environments in Portugal
- (2) Validate the QLTE-PT by assessing its internal consistency, confirming its construct validity through exploratory and confirmatory factor analyses, and establishing both its convergent and discriminant validity

2. Materials and Methods

A sequential exploratory mixed-method study was conducted in two stages [23]. The first stage aimed to develop the questionnaire. The second stage followed a quantitative study to analyze its psychometric properties.

The questionnaire development and validation process were based on DeVellis's [24] steps for instrument development which are as follows: (a) determine what is intended to be measured; (b) generate a set of items; (c) determine the measurement format of the instrument; (d) review the set of items formulated from a panel of experts; (e) consider the inclusion of validation items; (f) apply the items to a sample; (g) evaluate the items; and (h) optimize the dimensionality of the instrument.

2.1. Generate a Set of Items. Items were generated based on a scoping review and a focus group, which are both strategies to generate a pool of items for new instruments [25, 26].

2.1.1. Scoping Review. The scoping review was conducted in accordance with JBI guidelines [27], aiming to map the personality traits, competencies, behaviours, and leadership styles of nurse leaders and managers impacting the outcomes of multicultural nursing teams. Papers published in English, Portuguese, and Spanish languages were searched through electronic databases, such as CINAHL, MEDLINE, Nursing & Allied Health Collection, MedicLatina, Psychology and Behavioural Sciences Collection, Wiley Online Library, and Scopus. We did not restrict the publication dates in our scoping review due to the lack of previous literature reviews on this topic. This approach enabled us to

comprehensively access the best available evidence without temporal constraints. The search strategy comprised the following keywords: nursing leadership, leadership traits, competencies, behaviours, skills, and styles; multicultural nursing teams, and nurses' outcomes.

2.1.2. Focus Group. A qualitative, exploratory focus group study was conducted to explore the strategies used by nurse managers in creating favorable work environments for multicultural teams and delivering culturally congruent care to diverse patients [28]. A convenience sample of five Portuguese nurses with experience leading multicultural nursing teams was recruited to participate in the study. A semistructured interview was performed with questions aimed at eliciting participants' insights on transcultural nursing leadership, effective management interventions for multicultural nursing teams, and strategies to improve culturally congruent care. Qualitative data were recorded and transcribed for content analysis.

Based on the results of both studies, a list of the most relevant nurse leaders and managers' behaviours in multicultural nursing work environments was produced. The items were revised to ensure appropriate wording and to remove duplicates. A first draft of the questionnaire was prepared.

2.2. Determine the Measurement Format of the Instrument. All items of the questionnaire were scored based on a 5-point Likert scale ((1) "never," (2) "rarely," (3) "sometimes," (4) "frequently," and (5) "always"), representing a continuum of the frequency of nurse leaders or managers' behaviours in multicultural nursing work environments. This choice is based on Boateng et al.'s [25] guidelines, which advocate that response scales with five to seven points have higher reliability than Likert-type response scales with less than five points.

2.3. Reviewing the Set of Items Formulated from a Panel of Experts. Once the items had been formulated, an assessment of the questionnaire's psychometric properties was conducted to analyze whether it was adequate and accurate in assessing transcultural nursing leadership, as well as to evaluate its validity and reliability [29]. This stage comprised two phases: content validity and construct validity.

Content validity is invaluable for the quality of a newly developed instrument [29]. Since there is no specific statistical test for this purpose, it is common to use a panel of experts to assess the set of items formulated and validate whether they accurately represent the construct measured by the new instrument [30].

The experts were recruited by convenience in a Portuguese association of nurse managers and leadership. Following the recommendations of Polit and Beck [26], it was defined that at least two rounds would be performed to determine the content validity of the items and the questionnaire as a whole. In the first round, each item was assessed regarding its degree of relevance, clarity, simplicity

and ambiguity, on a scale of 1 (not relevant) to 4 (very relevant), according to the criteria described by Yaghmale [31]. Once assessed in each criterion, the content validity index of each item (I-CVI) was calculated based on the ratings assigned by the experts regarding its degree of relevance [26, 29].

Following the authors' recommendations, it was determined that items with a I-CVI of <0.78 would be excluded from the questionnaire [26, 29]. The items with a I-CVI of ≥ 0.78 but with values of <1 in the criteria of clarity, simplicity, and ambiguity, estimated according to the previous formula were reformulated. After this process of item deletion and reformulation, a second round of relevance assessment of the remaining and reformulated items was carried out. The I-CVI of each item was calculated and the overall content validity index of the questionnaire (Ave-CVI) was estimated from the average of the I-CVIs [29]. It was considered that a I-CVI ≥ 0.78 on each item and an Ave-CVI of ≥ 0.90 would be indicative of an excellent content validity [26]. The estimated value of Ave-CVI in the second round would determine the need for questionnaire reformulation and additional rounds.

2.4. Consider the Inclusion of Validation Items. Although it is possible to include additional scales that may provide information about the validity of the final questionnaire [24], it is recommended that researchers limit these efforts at this stage of developing a new instrument. According to Worthington and Whittaker [32], it is advisable to keep the overall length of the questionnaire as short as possible and directly related to the central aim of the study. Worthington and Whittaker [32] also argue that there is a potential risk that items from other scales may interact with the items designed for the new instrument, interfering with its development process. Therefore, it is important to avoid influencing the items' responses during the initial phase of instrument development, thus limiting the use of additional measures [32]. Understanding the risks highlighted by Worthington and Whittaker [32], it was decided to not include validation items as recommended by DeVellis [24].

2.5. Evaluating and Refining the Instrument. Following the establishment of content validity, a quantitative and cross-sectional study was conducted to identify the core dimensions of transcultural nursing leadership and to confirm the reliability of the instrument. For this purpose, an exploratory factor analysis (EFA) was performed followed by a confirmatory factor analysis (CFA).

Nurses registered in the Portuguese Order of Nurses in the categories of nurse manager, nurse specialist, or nurse, with current or past leadership experience in multicultural nursing work environments were invited to participate in this study. Nurses without leadership experience in multicultural nursing work environments were excluded. The sample size was based on guidelines recommending five to ten participants for each questionnaire item to ensure a robust analysis in EFA and CFA [33].

During EFA, the correlations between items were assessed using the Kaiser–Meyer–Olkin (KMO) measure to ensure that they were suitable for factor analysis. The analysis was then performed using an appropriate estimator for ordinal data (WLSMV), robust to deviations from normal distribution [34]. For the extraction of factors in our EFA, we employed the principal component as the method to identify the initial structure of latent factors, followed by an oblique rotation to explore the relationships between these factors. The number of latent factors identified considered both the eigenvalues greater than 1 and the scree plot. We then retained factors explaining a significant portion of the total variance and removed individual items with factor loadings below 0.50.

The instrument was refined by repeating EFA, ensuring that each factor was reliable and represented by at least two items. The quality of the factor structure was assessed using the root mean square residual (RMSR) index.

Confirmatory factor analysis was performed to assess the validity of the factor structure identified in EFA. It analyzed the existence of outliers by analyzing the square distance of Mahalanobis (D^2). The normality of the variables was assessed by the uni- and multivariate asymmetry ($|Sk| < 3$) and kurtosis ($|Ku| < 10$) coefficients [35]. The quality of the model was assessed through the indices proposed by Brown [36] and Marôco [35]: CFI (< 0.8 : bad fit), TLI ($(0.9; 0.95)$: good fit), SRMR (≤ 0.08 : good fit), and RMSEA (> 0.08 – 0.10 : unacceptable; $(0.05; 0.08)$: acceptable; and ≤ 0.05 : very good). Necessary adjustments were made based on modification indices greater than 11 and theoretical justification, as recommended by Marôco [35].

Finally, item reliability was assessed based on the proportion of variance accounted for by the latent factor, with a target value of 0.25 or higher [35]. The overall instrument's reliability, as well as that of individual factors, was determined using Cronbach's alpha, setting a minimum acceptable level of 0.70 [37]. Construct validity was established through analyses of convergent and discriminant validity [30, 35]. Missing values were handled with the pairwise method in both EFA and CFA.

All statistical analyses were conducted in RStudio (© 2009–2022 RStudio, PBC) using packages “polycor,” “psych,” “lavaan,” and “lavaanPlot.”

2.6. Ethical Considerations. This study was first approved by the Ethics Committee of the Nursing School of Lisbon (approval no. 216/2022/CE), as part of the doctoral research project. Authorization and support were requested from a Portuguese association of nurse managers and leadership to recruit nurses to integrate the panel of experts to perform the content validity of the questionnaire. Once the content validity phase was completed, authorization and support were also requested from the Portuguese Order of Nurses to disseminate the study to its members and invite those with the experience of leadership in multicultural nursing work environments to complete the questionnaire online. All participants approved their participation through an electronic consent form, without which they could not proceed

to data collection. All participants were informed that they could withdraw from the study at any moment. Anonymity and data confidentiality were guaranteed.

3. Results

3.1. Generation of Items. A total of 115 and 63 items were formulated from the scoping review and the focus group study, respectively. After removing duplicates and similar items, 145 items composed the initial version of the QLTE-PT.

3.2. Content Validity. A total of six members of the Portuguese association of nurse leaders and managers participated in the panel of experts, meeting the minimum number of experts recommended to assess the content validity of an instrument [29]. Half of the participants were female, with a mean age of 53.8 years ($SD = 7.7$) and 31.7 years of professional experience ($SD = 7.4$). More than 50% held a master's degree or PhD degree, 16.7% were nurse specialists, and 16.7% had a bachelor's degree. About 67% were nurse managers. All experts of the panel stated that they worked or had worked with professionals from different cultural backgrounds, but none of them were or had been emigrants. None of the participants had education in multiculturalism.

Of the 145 items rated by the experts regarding their degree of relevance, 98.6% ($n = 143$) had a I-CVI ≥ 0.78 . Two items were excluded from the questionnaire due to I-CVI = 0.67. Only two participants wrote comments/suggestions for improvement, which were “simplify some items.” In some cases, it may even be necessary to “split one item into two” and “some questions were too long, which makes it difficult to answer them.” However, these two participants did not specify items for these actions. Due to the lack of specific guidance on which items to modify, a conservative approach proceeded in the revision process. The original structure of the items was maintained, focusing instead on improving items' clarity, simplicity, and reducing ambiguity. Fifty-one items, which had clarity, simplicity, or ambiguity indices below 1, were rephrased. These revised items, along with the others, constituted a set of 143 items that underwent a second round of evaluation. Five of the six experts from the previous round participated in the second round. Of the 143 items, 94.4% ($n = 135$) obtained a I-CVI of ≥ 0.78 and eight were eliminated due to a I-CVI of < 0.78 . No comments or suggestions for improvement were made in the second round. The questionnaire showed an Ave-CVI of 0.96. As a strategy to obtain a more parsimonious set of items, it was decided to consider the items' Content Validity Ratios (CVRs).

Twenty-nine items were identified as essential/very relevant with CVR = 1. It was decided to retain 10 additional items, despite having a CVR of < 1 , given their relevance highlighted in the literature. For instance, item “I adapt my leadership style according to the expectations, values, habits, beliefs, and cultures of the members of the nursing team member” was aligned with established theoretical

frameworks [3, 38] and empirical studies [5, 28] within the field that underscore their significance in assessing transcultural leadership. These decisions resulted in a total of 39 items included in the QLTE-PT, categorized into seven hypothetical dimensions: impartiality and nurse manager's ability to adapt, understand, accept, and respond to cultural differences; professional and sociocultural integration of immigrant nurses; standardization of nursing practice; supporting professional development; managing problems in multicultural teams; intercultural communication; and culturally congruent services and care. Figure 1 summarizes the process of item generation, inclusion, and exclusion from the QLTE-PT.

3.3. Reliability of QLTE-PT

3.3.1. Sample Characteristics. Four hundred and sixty-three nurses answered the questionnaire between November 2022 and March 2023, among whom 79.3% were female and 21.7% were male. The average age of the participants was 41.3 years ($SD = 10.6$), and the mean length of professional nursing experience was 18.2 years ($SD = 10.6$). More than 20% reported working or having worked abroad, namely, in Belgium, Brazil, Cape Verde, France, Germany, Guinea-Bissau, Indonesia, Oman, São Tomé and Príncipe, Saudi Arabia, Switzerland, Timor-Leste, and the United Kingdom. Data about education level, professional category, work unit, exposure to other cultures and in which context, training in multiculturalism, and international professional experience are comprehensively presented in Table 1.

3.3.2. Exploratory Factor Analysis. EFA was performed to identify the relational structure among the 39 items of the QLTE-PT. The findings of the preliminary factor analysis showed a KMO value of 0.85, which indicates the adequacy of the instrument's items for factor analysis. The factorability was confirmed for the 39 items by Bartlett's test of sphericity ($X^2 = 1370.5$; $p < 0.001$).

According to the criterion of eigenvalue greater than 1 and in line with the scree plot, the relational structure of the QLTE-PT would be explained by the nine latent factors explaining 73.2% of the variance. This initial factor structure of the questionnaire resulted in a problematic factor with only one item (item A32). Subsequent attempts to refine the structure by extracting eight factors still yielded another one-item factor (item A17). Even when reducing the factors to seven, the internal consistency of the two factors fell below the recommended threshold of 0.70 ($\alpha = 0.62$ and $\alpha = 0.66$). To improve the questionnaire's psychometric properties, we conducted further analyses, ultimately settling on a factor structure with six factors, which provided a more coherent and interpretable model. The factor structure comprising six factors was successfully derived, explaining a total variance of 64%. Fourteen items were removed due to factor loadings below 0.50. The six retained factors were found to aptly describe the correlational structure between the items, and the factor structure exhibited a good quality of adjustment

(RMSR = 0.059). The overall internal consistency of the questionnaire was demonstrated to be robust ($\alpha = 0.90$). In addition, each of the six factors retained in the factor analysis also showed a good internal consistency ($\alpha \geq 0.69$). These results affirm the reliability of the instrument both as a whole and in its individual factors. Table 2 provides a comprehensive summary of the factor loadings, communalities, percentage of explained variance, overall internal consistency, and individual factors' internal consistency.

3.3.3. Confirmatory Factor Analysis. The first CFA revealed an initial poor quality of adjustment (CFI = 0.961, TLI = 0.955, SRMR = 0.089, and RMSEA = 0.091). To enhance the model, outlier observations were removed. Items A24 and A25, which exhibited modification indices suggesting saturation in at least two other factors, were also removed from the model. Furthermore, we correlated the measurement errors of items with higher modification indices (A34-A35, A3-A4, A35-A6, A5-A6, A35-A31, and A15-A8) to improve the model quality. Following these refinements, the model demonstrated good fit indices (CFI = 0.980, TLI = 0.976, SRMR = 0.078, and RMSEA = 0.070) and good internal consistency, providing robust support for the factor validity of the QLTE-PT.

All items had standardized factor loadings greater than 0.50 and individual reliability ($\lambda_{ij} \geq 0.25$). It was observed that the average variance extracted (AVE) supported all factors' convergent validity. The discriminant validity of the factors was evaluated by comparing the AVE with the squared correlations between the factors (Table 3). It was found that each of the factors had an AVE greater than the square of its correlation with the other factors, which supported that all factors had a discriminant validity.

The first factor was designated as "supporting culturally congruent care" (CCC), the second as "managing intercultural issues" (MII), the third as "inclusive and unbiased management" (IUM), the fourth as "cultural sensitivity and adaptation" (CSA), the fifth factor as "integration in the nursing work environment" (INWE), and the last factor was designated as "adjusting care to cultural expectations" (ACCE). Figure 2 provides a visual representation of the final six-factor model of QLTE-PT.

4. Discussion

The development and validation of the Portuguese Transcultural Nursing Leadership Questionnaire (QLTE-PT) fills the gap in assessment tools for transcultural nursing leadership. It revealed a six-factor structure and 23 items that robustly encapsulate essential aspects of transcultural nursing leadership. These factors include supporting culturally congruent care, managing intercultural issues, inclusive and unbiased management, cultural sensitivity and adaptation, integration in the nursing work environment, and adjusting care to cultural expectations. The instrument demonstrates strong internal consistency, with an overall Cronbach's alpha value of 0.90, which is higher than the expected α and equal or higher than 0.70 for new instruments [37]. It explains a total

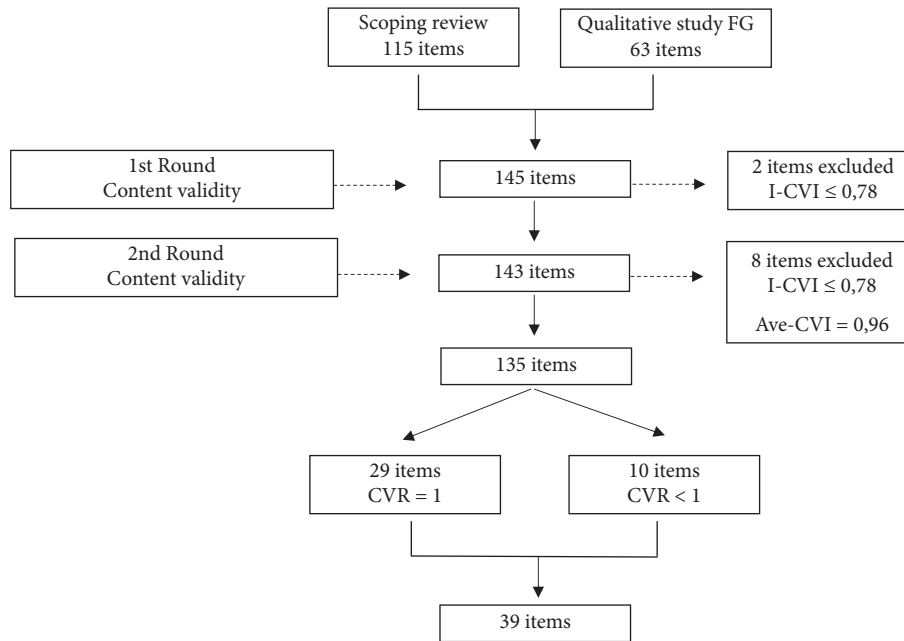


FIGURE 1: Process of items' generation, inclusion, and exclusion from the QLTE-PT.

TABLE 1: Sociodemographic and professional characteristics ($n = 463$).

Sociodemographic and professional data		Frequency	Percentage
Education level	Bachelor	224	48.4
	Master degree	181	39.1
	Specialty	52	11.2
	Doctorate	6	1.3
Professional category	Nurse	172	37.1
	Nurse specialist	98	21.2
	Nurse manager	110	23.8
	Team leader	83	17.9
Work unit	Surgery	67	14.5
	Medicine	63	13.6
	Emergency room	56	12.1
	Paediatrics	47	10.2
	Community	38	8.2
	Outpatient clinics	22	4.8
	Psychiatry	13	2.8
	Obstetrics	8	1.7
	Others	149	32.2
Exposure to other cultures	Usually	220	47.5
	Sometimes	114	24.6
	Always	98	21.2
	Rarely	31	6.7
Cultural exposure context	Professional	182	39.3
	Personal	15	3.2
	Both	266	57.5
Training in multiculturalism	Yes	33	7.1
	No	430	92.9
International experience	Yes	99	21.4
	No	364	78.6

variance of 64%, which is also higher than the minimum expected for social sciences [33], indicating its effectiveness in capturing the complexity of transcultural nursing leadership in multicultural nursing work environments.

During the stage of the questionnaire's development, 135 items obtained a I-CVI of ≥ 0.78 and the questionnaire showed an Ave-CVI of 0.96, meeting the required criterion of Ave-CVI of ≥ 0.90 [26, 29]. Although the criteria for an

TABLE 2: Exploratory factor analysis of the QLTE-PT.

Items	Factors						Communalities
	1	2	3	4	5	6	
A35	0.784	—	—	—	—	—	0.698
A34	0.717	—	—	—	—	—	0.704
A32	0.711	—	—	—	—	—	0.638
A30	0.549	—	—	—	—	—	0.496
A31	0.533	—	—	—	—	—	0.596
A26	—	0.836	—	—	—	—	0.834
A27	—	0.765	—	—	—	—	0.727
A15	—	0.715	—	—	—	—	0.665
A28	—	0.566	—	—	—	—	0.641
A2	—	—	0.838	—	—	—	0.722
A3	—	—	0.730	—	—	—	0.787
A7	—	—	0.622	—	—	—	0.681
A24	—	—	0.532	—	—	—	0.608
A1	—	—	0.513	—	—	—	0.449
A5	—	—	—	0.833	—	—	0.781
A6	—	—	—	0.814	—	—	0.800
A8	—	—	—	0.635	—	—	0.738
A4	—	—	—	0.606	—	—	0.583
A25	—	—	—	0.521	—	—	0.519
A17	—	—	—	—	0.808	—	0.717
A13	—	—	—	—	0.561	—	0.602
A19	—	—	—	—	0.524	—	0.524
A38	—	—	—	—	—	0.791	0.791
A36	—	—	—	—	—	0.733	0.733
A37	—	—	—	—	—	0.564	0.564
Variance	13.9%	13.6%	11.3%	9.3%	8.8%	7.1%	
Cronbach's alpha	0.81	0.79	0.76	0.76	0.76	0.69	
			64%	0.90			

TABLE 3: Correlations and squared correlations between the factors.

	1	r^2_{ij}	2	r^2_{ij}	3	r^2_{ij}	4	r^2_{ij}	5	r^2_{ij}	6	r^2_{ij}
1												
2	0.620	0.384										
3	0.570	0.325	0.480	0.230								
4	0.453	0.205	0.641	0.411	0.587	0.345						
5	0.648	0.420	0.502	0.252	0.693	0.480	0.405	0.164				
6	0.509	0.259	0.539	0.291	0.210	0.044	0.456	0.208	0.309	0.095		
AVE	0.477		0.726		0.555		0.541		0.598		0.492	

excellent content validity were assured, the high dimensionality of the questionnaire in its initial development phase raised concerns. In the early stages of questionnaire design, it should not be so long that it reduces the likelihood of potential participants answering or completing all the items, nor too short that it fails to cover all aspects of the construct it is intended to measure [32]. Such imbalances pose risks to the internal consistency of the construct and can affect the relationships and correlations among items within specific factors or domains [29]. As a strategy to obtain a more parsimonious set of items, it was decided to consider also the items' CVR as proposed by Lawshe, cited

by Almasreh et al. [29], which reduced the number of items from 135 to 29.

The inclusion of 10 additional items with a CVR of <1 proved to be a significant step in the development of the QLTE-PT. Only two of these items were dropped during the EFA due to factor loadings below 0.50, which underscores the importance and relevance of the remaining eight items, as they contribute meaningful dimensions to the overall construct despite their initial lower CVR scores.

The first factor, "supporting culturally congruent care," showed good internal consistency, as evidenced by a high Cronbach's alpha value ($\alpha=0.81$). This indicates that the

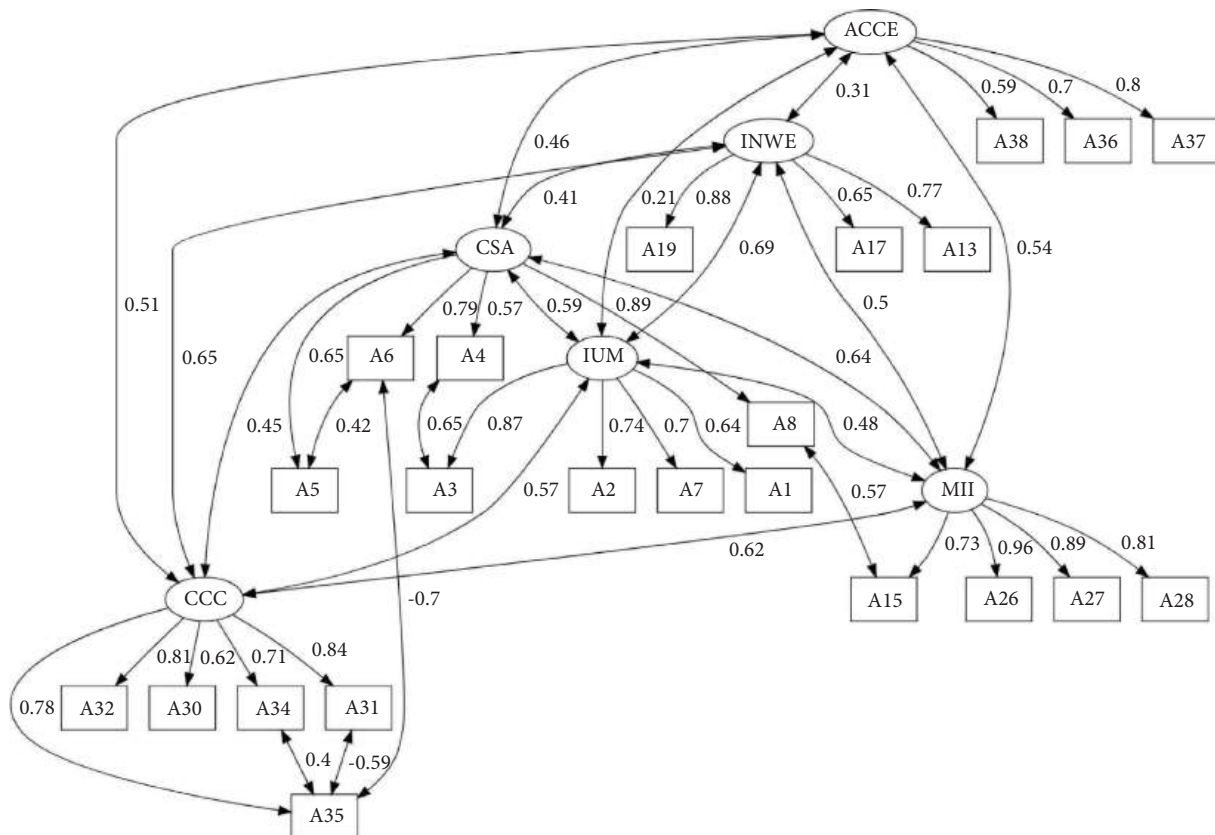


FIGURE 2: Six-factor model of QLTE-PT (CFI = 0.980, TLI = 0.976, SRMR = 0.078, and RMSEA = 0.070). Standardized loads and covariances.

items within this factor reliably measure the intended construct. The factor accounted for a significant portion of the total variance (13.9%), demonstrating its substantial contribution to the overall model. This factor comprises five items that encapsulate the actions taken by nurse leaders and managers to assist nurses in enhancing the quality of care they provide to patients from different cultural backgrounds. Examples of such actions include “I encourage immigrant nurses to take a course on the local language and facilitate their schedules to be able to attend it,” “I conduct trainings that enable nurses to provide culturally congruent nursing care,” and “I provide nurses with pamphlets and handbooks related to the delivery of culturally congruent nursing care.” These items align closely with the established strategies to improve culturally congruent care in nursing literature, which supports the convergent validity of this factor. According to Russell [7], a transcultural nurse leader engages nurses, nursing students, and other healthcare professionals in a learning process of what it means to deliver culturally congruent care to culturally diverse populations. Providing written documentation on culturally congruent care [39], introducing transcultural education in services [40] and encouraging nurses to attend culture-related training sessions and activities, and ensuring their coverage during their absence from the shift [41] are a few examples of how this learning process may be conducted that support this factor. This factor includes also an item related to the nurse leader or manager’s improvement to

communicate effectively with nurses of different nationalities and cultures, which is supported by the literature about the importance of engaging in ongoing training that enhances the skills related to culture and diversity in the workplace [41]. The discriminant validity of this factor is supported by its distinctiveness from other factors in the model. The relatively low correlations with other factors indicate that it measures a unique aspect of transcultural nursing leadership, separate from other leadership dimensions captured in the QLTE-PT.

The second factor “managing intercultural issues” contains four items, for instance, “I investigate events related to verbal or physical abuse, discriminatory behaviour, and harassment, and implement measures that reduce the risk of occurrence.” It comprises nurse leaders and managers’ attitudes and actions to prevent, resolve, and mitigate problems arising from cultural differences between nurses. This factor demonstrated a good internal consistency ($\alpha = 0.79$), reflecting the coherence of its four items in assessing leadership approaches to intercultural challenges. The factor’s significant contribution to the total variance (13.6%) underscores its importance in the overall construct of transcultural nursing leadership. Convergent validity for this factor is supported by literature emphasizing the critical role of nurse leaders in addressing and resolving cultural conflicts and fostering a harmonious work environment. For instance, Munkejord [42] argues that healthcare managers can contribute to challenging the ethnic pyramid often

identified in culturally diverse institutions by implementing diversity-sensitive measures. Encouraging and arranging dialogue and collaboration among staff are one of those measures that lead to better relationships and reduce ethically based discrimination [42]. Nurses from ethnic minorities need to feel supported in the nonthreatening work environment. They also need to know that corrective actions will be implemented if the behaviour of an employee or group of employees is considered harmful [43]. The distinctiveness of this factor from others in the questionnaire, as shown by its discriminant validity, highlights its unique role in transcultural nursing leadership.

Factor 3 was labelled as “inclusive and unbiased management” as it concerns the degree to which the decision-making process of the nurse leader or manager deviates from favoring some nurses. It demonstrated a significant internal consistency ($\alpha = 0.76$), which suggests that the item effectively captures the essence of unbiased and inclusive decision-making in transcultural nursing leadership. Factor 3 is composed of four items, including “I have a transparent policy in the unit regarding the method of organizing nursing care, schedules, holidays, annual appraisal, and promotions.” Convergent validity for this factor is evident in its alignment with existing literature on the importance of equity and impartiality in leadership, particularly within culturally diverse healthcare settings. Studies have highlighted that nurse managers who show favoritism, plan schedules, and vacations unequally among nurses of different cultural backgrounds, and promote nurses based on cultural criteria over merit, impact negatively on migrant nurses’ job satisfaction, retention, and professional development [44, 45]. Discriminant validity is also well-established, with this factor distinctly measuring characteristics of leadership that are separate from others, as suggested by its low correlations with other factors in the QLTE-PT. This uniqueness is crucial in a transcultural context where unbiased and inclusive management is key to harmonizing a diverse workforce.

The fourth factor “cultural sensitivity and adaptation” is composed of four items aiming to describe nurse leaders and managers’ sensitivity to cultural differences and how this sensitivity is reflected in their attitudes and behaviours towards nurses. The internal consistency of this factor ($\alpha = 0.76$) confirms the reliability of the items in measuring cultural sensitivity and adaptation in nursing leadership. This factor’s convergent validity is supported by the existing research, such as studies by Sharifi et al. [46], which emphasizes cultural sensitivity as an attribute of cultural competence in nursing, translating into valuing, respecting, and admiring cultural diversity and helping nurses to understand how people’s attitudes and views affect their behaviours and care-seeking patterns. Examples of such nurse manager’s sensitivity and adaptation included in the QLTE-PT are “I am open to realities that are different from mine” and “I adapt my leadership style according to the expectations, values, habits, beliefs, and cultures of the nursing team members.” The distinctiveness of this factor from other factors in the QLTE-PT is evident in its unique focus on leaders’ ability to respect, understand, and adapt to

cultural differences, as outlined by Matveev [47]. Transcultural leaders must demonstrate the ability to adapt to the distinct expectations of their organization, community, competitors, and clients [3]. This supports the factor’s discriminant validity, as it captures unique aspects of transcultural leadership not covered by other factors.

Factor 5 “integration in the nursing work environment” comprises three items which highlight interventions targeted at the professional integration of immigrant nurses into the specificities of the nursing practice in the host unit, for example, “I implement a clinical orientation program specific to my unit to develop competencies of immigrant nurses with different levels of knowledge and professional experience” and “I recourse to international protocols to guide and standardise nursing practice in the team.” This factor demonstrated a good internal consistency ($\alpha = 0.76$), indicating that the items are cohesively capturing the essence of immigrant nurses’ integration in the work environment. Convergent validity is reinforced through literature emphasizing the need for supportive nursing work environments for diverse nursing staff. Integration in multicultural nursing work environments is a bidirectional process that involves efforts not only by the immigrant nurses but also by the host organization [48]. Rovito et al. [49] warn that sometimes nurses need to “unlearn” practices of nursing care that were common in their home country, since they are not a part of the nursing practice in the culture of the host country. According to Safari et al. [50], several strategies are needed to guide immigrant healthcare professionals in the culture of the host country before starting their clinical practice. A clinical orientation program is an example of a strategy that minimizes the impact of the challenges and difficulties migrant nurses experience, improves their well-being, the quality of care, and mitigates the risks to patient safety [51]. It is the nurse manager’s responsibility to provide guidance, invest in multicultural education and mentoring for these nurses, guide their practice to provide safe and culturally congruent care, and ensure competence development and efficient use of their expertise [52]. Discriminant validity is evident, as this factor uniquely addresses the integration of immigrant nurses in the work environment, distinct from other transcultural nursing leadership characteristics evidenced in the other factors.

The last factor was labelled as “adjusting care to cultural expectations.” It demonstrated an acceptable internal consistency ($\alpha = 0.69$), indicating that the items are able to capture nurse managers and leaders’ interventions to meet patients’ cultural expectations regarding nursing care. This factor is composed of three items such as “I request religious support congruent with patients’ beliefs (e.g., Chaplain, Imam, Brahmin, Lama, and other spiritual leaders).” According to Leininger and McFarland [38], if patients receive nursing care that is not compatible and respectful with patients’ ways of life, beliefs, and values, they will demonstrate signs of stress, nonadherence, cultural conflict, and ethical or moral concerns. This factor is in line with the guidelines for the implementation of culturally congruent nursing care in organizations, namely, the provision of structures and resources needed to meet patients’ cultural

needs [53]. It is also supported by existing literature on the responsibility of nurse managers to provide culturally and linguistically appropriate services to diverse populations [28, 54]. This literature supports the convergent validity of this factor. Furthermore, the distinctiveness of the factor, evident through discriminant validity, confirms its unique role in the QLTE-PT, differentiating it from other factors.

Although there is an overall agreement about the scenario of cultural diversity among patients and healthcare workers in Portugal, no studies have attempted to describe the leadership behaviours of nurse leaders and managers in multicultural nursing work environments in this country. Therefore, this paper is innovative and grants a questionnaire that addresses nurse leaders and managers' leadership behaviours in multicultural nursing work environments with applicability in Portugal.

4.1. Study Limitations. The findings of this study contribute to the field by providing a reliable and valid instrument for assessing transcultural nursing leadership. However, it is important to consider the limitations of this study and the implications they have for the generalizability and interpretation of the results.

First, self-report measures were utilized in this study, which are subject to potential biases. Participants may have provided socially desirable responses regarding their leadership behaviours in multicultural nursing work environments, leading to response bias. Efforts were made to minimize these biases through clear instructions to participants and ensuring data anonymity. However, it is important to acknowledge this limitation probability.

In addition, despite QLTE-PT having good internal consistency and construct validity, further validation in different cultural contexts is necessary. The current study focused on nurses registered with the Portuguese Order of Nurses and with experience of leadership in multicultural nursing work environments. Future research should aim to conduct cross-cultural validation to ensure the questionnaire's robustness across diverse cultural contexts. Future research should also include a criterion measure to provide a more comprehensive assessment of the questionnaire's validity.

5. Conclusions

This study successfully developed and validated the Portuguese Transcultural Nursing Leadership Questionnaire (QLTE-PT). The final instrument, comprising 23 items across six factors, demonstrates robust psychometric properties, including good internal consistency and construct validity. The QLTE-PT captures essential aspects of transcultural nursing leadership, making it a valuable tool for evaluating nurse managers and leaders' behaviours in multicultural nursing work environments. While acknowledging the study's limitations, the QLTE-PT represents a significant contribution to nursing management, offering insights into leadership behaviours in diverse healthcare settings. Due to its potential interest of use in other countries with multicultural healthcare settings, we recommend the

development of guidelines with comprehensive information about different methodological approaches to support the decision-making and the quality of the cross-cultural adaptation process [55].

6. Implications for Nursing Management

The development and validation of the QLTE-PT hold important implications for nursing management and leadership. By providing a reliable and valid instrument to assess transcultural nursing leadership, the QLTE-PT offers nurse managers a valuable tool to gain insights into their own leadership behaviours in their multicultural units or organizations and acknowledges the needs of their nursing staff and patients from different cultural backgrounds. The questionnaire can assist nurse managers in identifying areas for improvement in their leadership and promotes a supportive work environment for their multicultural nursing staff, conducive to the well-being and engagement of nurses. It can also contribute to improving the quality of care provided to patients from different cultural backgrounds, ensuring patients' safety, satisfaction with nursing care, and higher levels of adherence to treatments.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Review Article

Digital Competence among Healthcare Leaders: A Mixed-Methods Systematic Review

Noora Laakkonen,¹ Erika Jarva ,¹ Mira Hammarén ,¹ Outi Kanste ,^{1,2,3}
Maria Kääriäinen ,^{1,2,3} Anne Oikarinen ,^{1,2,3} and Kristina Mikkonen ,^{1,2,3}

¹Research Unit of Health Sciences and Technology, Faculty of Medicine, University of Oulu, Oulu, Finland

²The Finnish Centre for Evidence-Based Health Care: A Joanna Briggs Institute Centre of Excellence, Oulu, Finland

³Medical Research Center, Oulu University Hospital, Oulu, Finland

Correspondence should be addressed to Erika Jarva; erika.jarva@oulu.fi

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Background. New evidence on the digital competencies of healthcare leaders can provide essential knowledge for building training for the leaders to ensure high-quality patient care. **Objective.** The aim of this mixed-methods systematic review was to identify the current best evidence from qualitative, quantitative, and mixed-methods studies on healthcare leaders' digital competence experiences and perceptions and factors associated with it. **Methods.** A mixed-methods systematic review was conducted following the Joanna Briggs Institute guidelines for mixed-methods systematic reviews by including original qualitative and quantitative observational studies and mixed-methods studies published in English or Finnish between January 2012 and January 2024. The studies were retrieved from four databases (CINAHL, PubMed, Scopus, and Medici). In total, 4470 articles were screened, 122 were eligible for full-text screening, and 19 articles were included in the review according to the established inclusion and exclusion criteria. **Data Extraction and Synthesis.** Data tabulation and narrative synthesis for quantitative studies and content analysis for qualitative studies. **Results.** The synthesis of qualitative data identified five main categories that describe healthcare leaders' experiences with digital competencies: (1) the need for developing leader's own, professionals', and patients' competence in the digitalisation of healthcare, (2) the need for expertise in the health IT implementation process, (3) positive perceptions towards technology, (4) negative perceptions towards technology, and (5) ability to act as an advocate to implement technology into practice. Data from the selected quantitative studies presents that factors associated with the digital competence of healthcare leaders include individual characteristics, career characteristics, training, and other factors. **Conclusion.** This review suggests that developing and supporting healthcare leaders' digital competencies should be considered in healthcare organizations, research, and education to make their digital competencies meet the demands of increasingly digitalising healthcare development work.

1. Introduction

Digitalising services and their integration into patient care challenge the competence needed in social and healthcare [1]. The lack of education and training of healthcare leaders may explain the low success rate of implementing digital solutions in healthcare. Previous research has found that managers are often self-taught in the use of digital health services [2], and a knowledge gap has been recognised in the healthcare leaders' digital competencies in the rapidly

evolving and digitalising healthcare environments [3]. The digital working culture of healthcare has changed rapidly due to the coronavirus pandemic, for example, in digital work interaction. Primary healthcare leaders predict that digitalisation in healthcare will develop further [4]. Digitalising healthcare requires adaptation to the requirements and needs of the changing working life, both from employees and leaders [5], and to fully participate in healthcare management in an era of rapidly evolving health information technologies, nursing leaders need to acquire

health information technology skills related to their clinical leadership roles and responsibilities [3, 6]. The European Commission [7] defines digital competence as “the confident and critical use of Information Society Technology (IST) for work, leisure and communication. . . underpinned by basic skills in information technology to retrieve, assess, store, produce, present and exchange information, to communicate and participate in collaborative networks via the Internet.” Mainz et al. [8] reported in their review that digital competence in healthcare can be divided into technical, methodological, personal, and social skills. The technical competencies identified encompass proficiency in basic computer use and wireless devices, applied skills in digital health, anticipation of advanced digital capabilities, technology administration, ethical considerations, and legal aspects of digitalisation. Methodological competencies include proficiency in data and information processing, problem-solving abilities, continuous learning, project management, and research skills. Self-reflection, critical thinking, professionalism, creativity, and innovative behaviour are considered to be personal competencies; and focus on patients, working in teams, communication competence, teaching, and networking skills are categorised as social competencies in digital competence in healthcare.

Health information technologies have good potential to improve the quality, safety, patient-centeredness, and cost-effectiveness of treatment [9]. In the increasingly digitalising healthcare environments, the need for competence management of nursing leaders has been emphasised as healthcare organizations acquire and implement different technologies and health information systems to support nursing work. Nursing leaders need to participate in decision-making in the selection, planning, deployment, and evaluation of these technological procurements (Reference [10]). Due to the rapid integration of digital health technologies, healthcare leaders must have the expertise and confidence to implement and incorporate these technologies into healthcare [11] to support healthcare professionals’ digital competence and thus contribute to ensuring quality patient care [12]. According to Carson et al. [13], nursing leadership is crucial in enhancing electronic health record (EHR) satisfaction and usability by fostering a positive culture of staff engagement and promoting EHR adoption. Proficiency in EHRs is essential for nursing leaders to serve as role models for staff, enabling effective communication and support for evolving functionalities that enhance patient care workflows [13]. Due to some nurses’ insufficient digital competence, hospital management and nurse leadership need to recognise the critical role of aligning technology with tasks and individuals to ensure the successful adoption of health information technology [14]. Healthcare leaders and professionals have highlighted the importance of leaders’ role and digital competence in enhancing and disseminating digital skills; leaders need to grasp the principles and functionalities of digital tools and devices and understand their potential benefits for professionals and patients [15, 16].

Previous research has shown that healthcare leaders need help and training in using and introducing technology in their work community [2, 17, 18]. It has been found that healthcare leaders have not always received training in

information technology, or training has been insufficient [6, 19], for example, in the use of ICT and digital healthcare applications and programs [2]. According to Ravelin et al. [4], attention must be paid to the digital competencies of healthcare leaders because, according to their experience, leaders must first have capability in the use of information technology so that they can guide employees in the use of information technology. Healthcare leaders need capabilities and contextual competencies to effectively utilise complex digital tools in a changing environment, alongside improving digital health literacy, to inform strategic and operational decisions [20]. However, healthcare leaders continue encountering various barriers, such as infrastructure, technical, training, legal, ethical, time, and workload issues, when using digital health technologies, irrespective of care level or specific technology [21].

There is widespread optimism regarding artificial intelligence’s (AI) potential to enhance healthcare across diagnostics and treatment [22, 23]. When applied to nursing practice, AI can be a practical resource for leaders yielding positive outcomes in patient care and safety [24]. Also, Laukka et al. [25] suggest that AI can induce benefits on various areas of health care, including the work of nursing leaders. AI is ready to support healthcare workers across administrative tasks, clinical documentation, patient outreach, and specialised areas like image analysis and medical device automation [22]. AI systems offer notable potential in supporting comprehensive health services management and can aid doctors, nurses, and leaders in their roles [26]. For example, the integration of AI-driven triage systems can optimise operations in primary care and thus induce more proactive and tailored approach to healthcare delivery [23]. According to Neher et al. [27], healthcare leaders gearing up for AI implementation recognised its potential to improve healthcare, holding high expectations for its relative advantage; however, they were less certain about its evidence base, particularly regarding safety and effectiveness. Additionally, leaders were cautious about factors like trialability, adaptability, design, and costs [27]. Moreover, leaders have been reported to be concerned with the organization’s internal capacity for strategic change management and the possibilities to amplify competence and expertise in the use of AI systems [23]. Successful AI implementation and integration require a team with diverse expertise on AI, collaboration within and beyond the healthcare realm, and the development of an organisation-wide AI innovation culture where healthcare leaders play a significant role [23, 28].

In recent years, there has been more focus put on the digital competence of healthcare professionals at large [8, 12, 29–33], but in most cases, healthcare leaders have not been the main subject of the study, or their results have not been separated from other healthcare professionals’ results which makes it difficult to interpret specifically leaders’ digital competence areas or needs. Certain studies and reviews [3, 6, 34] have specifically looked at the digital competence of healthcare leaders, focusing on knowledge and skills, dismissing other aspects related to digital competence, such as personal and social skills. Examining these different aspects of healthcare leaders’ digital competence is

essential as it influences employees' acceptance and usage of technology [35, 36], which has positive outcomes on patient treatment and processes [31]. To enable innovative service provision in digital healthcare, there is a need to enhance the digital competence and understanding of digital transformation among current and future healthcare leaders [11]. Synthesis of the evidence on the digital competence of healthcare leaders can provide essential knowledge for building further training for the leaders and their employees to ensure high-quality patient care in digitalised healthcare environments. For this reason, this mixed-method systematic review aimed to gather the most recent evidence on healthcare leaders' digital competence perceptions and associated factors.

2. Materials and Methods

2.1. Study Design. The Joanna Briggs Institute guidelines for mixed-methods systematic reviews [37] were followed in the implementation of this review. This mixed-methods systematic review protocol is registered with the Center for Open Science incorporation OSF (Open Science Framework) registries [38]. In this study, healthcare leaders refer to all persons positioned as managers or leaders in social and healthcare contexts, such as nurse leaders, nurse managers, and chief nursing officers. A mixed-method review was conducted to explore qualitative evidence on healthcare leaders' experiences relating to digital competence and synthesise quantitative findings from previous research concerning digital competence areas and factors associated with leaders' digital competence.

The research questions were

- (1) What kind of experiences do healthcare leaders have with digital competence?
- (2) What kind of digital competencies have been described for healthcare leaders?
- (3) What kind of factors are associated with the digital competencies of healthcare leaders?

2.2. Search Strategy. Original qualitative and quantitative observational studies and mixed studies, including both methodologies published in English or Finnish between 2012 and 2022, were included in this review. The year limitation was set because of rapid digitalisation development in healthcare since the last decade [39]. Yet, a stricter timeframe was neglected as the phenomenon of knowledge, skills, and attitudes related to the use of IST has a significant history. The studies were initially retrieved from four databases (CINAHL, PubMed, Scopus, and Medic) in October 2022. An additional search was conducted at the beginning of January 2024 to include the most recently published publications. Data search strategies, including used keywords and complete search phrases for used databases, are presented in supplementary file 1. Inclusion and exclusion criteria were defined before performing a database search according to PICo [37] and PEO [40] criteria. An information specialist was also

utilised during this stage of the research. Inclusion criteria were (P) participants in different roles of healthcare leaders and managers at all levels of the organization; (I) & (O) the phenomenon of interest included digital competence (knowledge, skills, and attitudes related to the use of IST); and (Co) the context of healthcare organizations. For quantitative studies, (E) exposure of interest included factors related to the digital competence of healthcare leaders at all levels of the organization. Exclusion criteria included participants other than leaders or managers, e.g., social and healthcare professionals, for phenomena of interest or outcomes other than digital competence, and for contexts other than healthcare organizations. Study protocols, reviews, conference papers, books, and non-scientific research articles and texts published before 2012 in languages other than English or Finnish were also excluded.

2.3. Search Outcomes. The database search resulted in 6294 studies. Among these studies, 1824 duplicates were found and removed. In total, 4470 studies were screened by title and abstract, and 122 were eligible for full-text screening. In addition, the references of chosen studies selected for the review were checked against the inclusion and exclusion criteria, but this did not add any more studies to this review. Each researcher conducted the screening process independently, and conflicts were solved via discussion or by a third party until agreement was reached. A total of 19 studies were agreed to be included in the mixed-methods systematic review, including seven cross-sectional, ten qualitative, and two mixed-methods studies (Figure 1) against the inclusion criteria [41].

2.4. Quality Appraisal. The methodological quality of the selected 19 studies relevant to the inclusion criteria was assessed using The Joanna Briggs Institute (JBI) Critical Appraisal tools; a checklist for analytical cross-sectional studies [40] including eight assessment criteria was used for quantitative studies ($n=7$), and a checklist for qualitative research [42] including ten assessment criteria was used for qualitative studies ($n=10$). Mixed-methods studies ($n=2$) were assessed using both of these checklists. Four researchers (blinded for review) assessed the methodological quality of the studies separately and discussed possible disagreements in assessments until an agreement was reached. Quality assessment (maximum points 100%) for quantitative studies resulted in a score of 75% in four studies [43–46], 62.5% in one study [47], and 50% in two studies [48, 49]. For qualitative studies, a score of 100% was attained by one study [50], seven studies attained 80% [2, 51–56], and 70% by two studies [57]; Simpson., 2013. The mixed-methods studies by Kujala et al. [58] scored 75% for the cross-sectional and 60% for the qualitative approach, and Mottelson et al. [59] scored 37.5% for the cross-sectional and 80% for the qualitative approach. The detailed results from the methodological quality appraisal are presented in supplementary file 2.

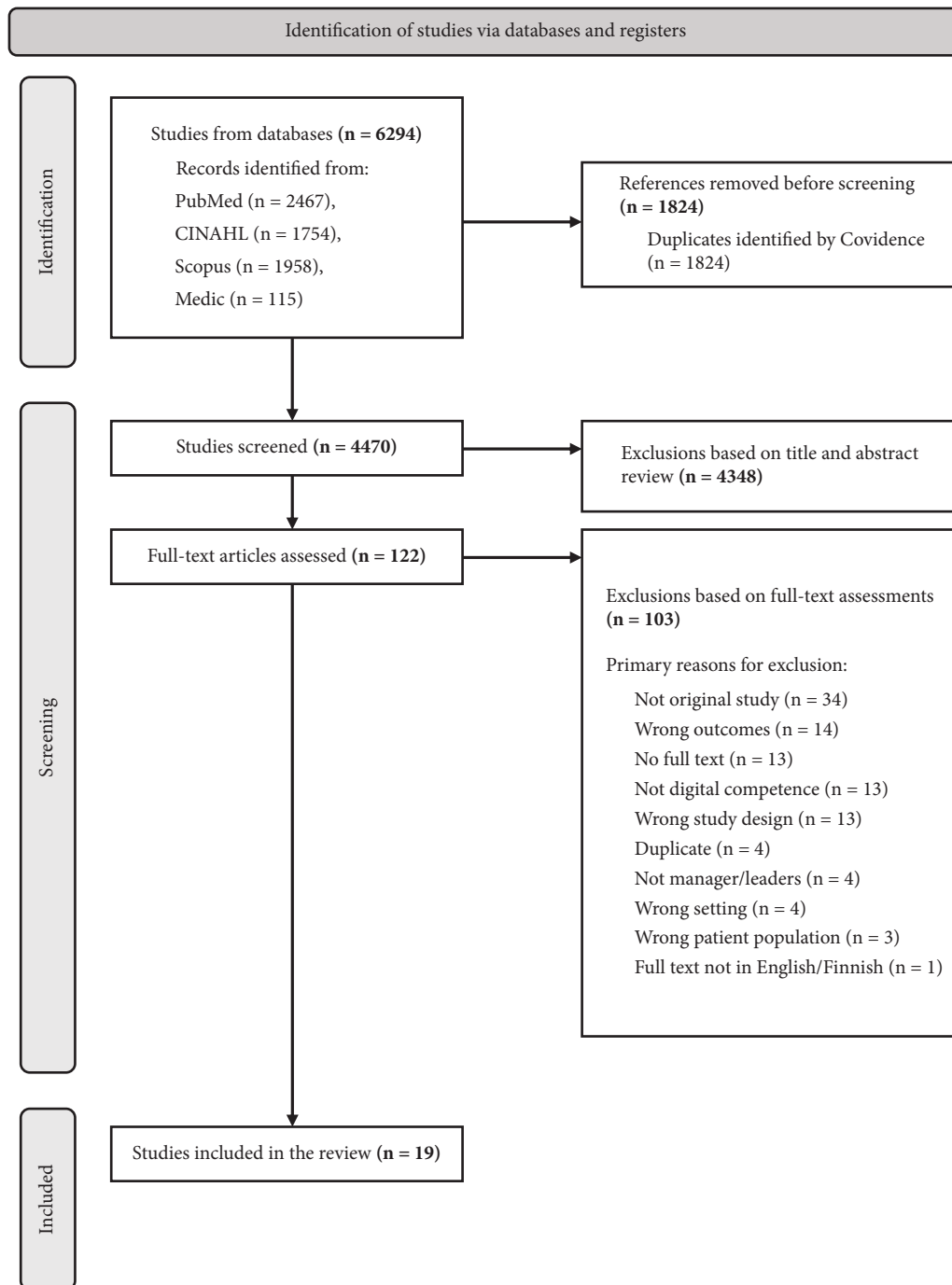


FIGURE 1: PRISMA flow diagram (Center for Reviews and Dissemination (CRD), 2009).

2.5. Data Extraction and Synthesis. Data extraction, including authors, the year of publication, the country of origin, purpose, participants, methodology, phenomena of interest or exposure of interest, outcomes, and the key findings, was assessed from all the articles included in the review (Table 1). The selected quantitative studies were synthesised using data tabulation and narrative synthesis. Qualitative studies were analyzed with content analysis to synthesise the results from healthcare leaders' digital competence experiences and descriptions [61].

3. Results

3.1. Characteristics of the Studies. The original studies were conducted in the USA ($n=5$), Finland ($n=3$), Portugal ($n=2$), Norway and Finland ($n=1$), Indonesia ($n=1$), Portugal and Brazil ($n=1$), Ghana ($n=1$), Qatar ($n=1$), Turkey ($n=1$), Japan ($n=1$), China ($n=1$), Denmark ($n=1$), and Australia ($n=1$). The study settings included specialised or university affiliated hospitals ($n=6$), public or general hospitals and healthcare organizations ($n=5$), a mixture of

TABLE 1: Extraction data.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [47], China	To examine current informatics competency levels of nurse managers and to identify the variables that influence these competencies	Nurse managers in a general hospital affiliated with Harbin Medical University (<i>n</i> = 68)	A cross-sectional study A questionnaire. (First part queries about the general characteristics of the respondents, second part investigates nurse managers' informatics competencies using 49 informatics competency items identified by Hart in three categories: computer skills (25 items), informatics knowledge (20 items), and informatics skills (4 items)) Statistical analysis	Levels and variables Informatics competence	The study presents that nurse managers' informatics competency is at a medium level, and the level of their informatics knowledge was significantly higher than their informatics and computer skills. The variability in informatics competencies was determined at 71.2% with information education/training, nursing administration experience, and the level of education, and these were significant factors in affecting nurse managers' informatics competency levels. Higher education and informatics education/training were positively affecting factors, and longer nursing administration experience was shown to negatively affect informatics competency levels

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [59], Denmark	To investigate the attitudes to and experiences with video interpretation among charge nurses in a Danish University Hospital	Charge nurses (Position as managers closely involved in determining nursing practice.) (n = 99)	Mixed methods An electronic questionnaire (pretested, developed for the study) A descriptive statistics and thematic text condensation	Attitudes and experiences Video interpretation	Most charge nurses using video interpretation expressed satisfaction with the technology and ease of use, and frequent users were more satisfied with video interpretation than rare users. Charge nurses in outpatient clinics were more frequent users compared to the inpatient departments and acute areas. Video interpretation was seen as a tool helping increase the quality of care and communication when there are language barriers, and dialogue and the relationship between the nurses and the patients seemed to be improved by the technology. Some of the charge nurses mentioned that video interpretation helped save time in consultations, but some found the technology complicated to use. Four different themes occurred when asked reasons not to use video interpretation: professional concern, administrative barriers, patient's state of health, and using alternative approaches. Challenges in using video interpretation were mostly related to practical issues: poor Internet connection, technical problems, and lack of equipment

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [43], Ghana	To examine the factors that influence the use of information and communication technology among nurse managers	Nursing unit managers ($n = 108$) of the selected health facilities in the Volta region of Ghana who were performing the role of frontline managers	A cross-sectional study design A self-administered questionnaire (developed for the study) Statistical analysis	Factors influencing information and communication technology knowledge and use (sex, age group, years of experience, the rank of the respondents, computer training, computer ownership, and the use of computers before the current position) The use of information and communication technology	Younger nurse managers were significantly more able to use ICT in nursing care than their older counterparts. Bachelor's or higher degree showed increased use of ICT in nursing care. Higher work experience years had a decreased effect on the nurse managers' use of ICT, compared with those with fewer years of work experience. Lower work experience in years showed increased likelihood to use ICT in the workplace, than more work experience in years. Higher knowledge of ICT use was shown to be associated with computer training before the current position

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [17], Finland	To examine the current state of eHealth competencies of clinical leaders in two public healthcare organizations in Finland	Clinical leaders (nurse leaders 32%, social worker leaders 25%, physician and dentist leaders 11%, other leaders 13%, and managers 19% ($n = 98$))	<p>Mixed methods</p> <p>An online questionnaire developed for the study with multiple-choice and open-ended questions and a 5-point Likert scale</p> <p>Descriptive statistics for quantitative data, content analysis for responses to the open questions</p>	State eHealth competencies	<p>Leaders need to organize workflows, support healthcare professionals in the change, and make sure that eHealth service quality is good enough and that patients are informed and guided. Leaders' self-perceived eHealth competencies were the strongest regarding security and privacy protection, on which they had recently had training. Most leaders were confident in using eHealth applications and services and leading change and supporting their subordinates' competence. Leaders felt the least confident in communicating about the new eHealth services to patients, customer-centered service development, and planning new eHealth services implementation. Many leaders did not feel confident in their tasks, which indicates the need for training and support; leaders called for more information about eHealth services and their benefits and possibilities. The study indicates the need for training in managing change and planning the implementation of new eHealth services. Leaders have a critical role in ensuring the successful adoption of new eHealth services and supporting healthcare professionals in order to avoid resistance to change</p>

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [48], Portugal	To analyze the association between the characteristics of nurse managers and the use of information technologies in Portuguese hospitals	Nurse managers ($n = 138$)	A cross-sectional study Questionnaire Likert scale (developed for the study) Statistical analysis	Associations Use of information technologies	The study presents it is evidence that the perception of ease of use and utility of the nurse managers towards IT is influenced by the scenario in which they work and their socio-occupational characteristics, especially gender, complementary training, and time of experience in services and management. It was also presented that this perception is unique to each IT
Reference [45], Japan	To determine managers' and staff nurses' perceptions regarding the technological competency as caring in nursing (TCCN) theory in general hospitals in Japan	Nurse managers ($n = 96$) and staff nurses ($n = 325$)	A cross-sectional study design A web-based questionnaire using the TCCNI-R, a 5-point Likert scale Statistical analysis	Perceptions Technological competency	The study presents that the nurse managers were more aware of TCCN than the registered nurses. In the factor "technology and caring," the study presents that nurse managers were more aware of providing care using technology and also about technological competency as an expression of caring in nursing than registered nurses. In the factor of "technological knowing," nurse managers recognised more fully the need-to-know patient needs through technology than registered nurses

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [44], Turkey	To identify nurse managers' opinions on artificial intelligence (AI) and robot nurses	Nurse managers ($n = 326$)	A cross-sectional descriptive study 21-Item online questionnaire form (developed for the study) Statistical analysis	Opinions Artificial intelligence and robot nurses	Most of the nurse managers were aware of the concept of AI and robot nurses and saw that AI would be beneficial for nurses and would reduce nurses' workload, and more than half stated that basic education on AI and robot nurses should be included in university programmes. Half of the nurse managers brought out that robot nurses should only fulfil nurses' orders, and not to be used in providing patient care independently. In case, problems arise in the patient care provided by the robots, the majority of participants stated that engineers, hospitals, and lastly the nurses should take responsibility for the actions of robot nurses; to engineers, the responsibility and safety, and to nurses the ethical responsibility for patient safety and nursing care regarding to robots
Reference [46], Finland	To determine nurse managers' opinions of information system support for performance management	Nurse managers ($n = 419$)	A cross-sectional study design Electronic questionnaire, a 5-point Likert scale Statistical analysis	Knowledge and opinions Information system support for performance management	Good computer literacy and working in social care were positively associated with the features or performance management information systems (assessing nursing performance and clinical procedure, managing resources, and providing timely evaluation and reporting). The use of the systems to facilitate follow-up was strongly associated with assessing nursing performance and managing resources Available in-service training was found to have a positive impact on the leaders' use of the information system

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [49], Portugal	To identify the technological profile of nurse managers	Nurse managers ($n = 74$) from two settings: hospital center in the Portuguese north region ($n = 30$) and members of the Portuguese association of nurse managers and leadership ($n = 44$)	An exploratory, descriptive, quantitative study A self-administered questionnaire Statistical analysis	ICT use The management process	Statistically significant differences were found between the groups in the use of web technologies, chat, e-mail, and videoconferencing. Nurse managers from the hospital center had more experience in ICT use, either in general or as part of the management process (e-mail and videoconferencing)
Author(s), year and country	Purpose	Participants	Methodology (design, data collection, and data analysis)	Phenomenon of interest (PiCO)	Key findings

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [60], United States	To identify and validate the gaps existing between selected chief nurse executives (CNEs) self-ascribed lived experience information technology competencies and those laid out by the American Organization of Nurse Executives (AONE)	CNE members of the Health Management Academy (HMA) ($n=7$)	A qualitative study design Ethnographic interviews Thematic content analysis	Gaps Information technology competencies	In the study, five dominant and often interwoven themes emerged: technology knowledge, collaboration, health information technology (HIT) selection, executive leadership, and standardization. CNEs have chosen to bypass, amassing deep technology knowledge, and to look for nurse informaticians and clinical nurse specialists to provide the deep technology knowledge they do not possess. Limited technology knowledge leaves CNEs unable to champion the collection, analysis, and trending of nursing data in a chief medical officer-dominated HIT discussion. CNEs saw that their lack of deep technological knowledge often hindered effective cooperation across cross-departmental and cross-operational lines. CNEs did not see HIT as a strategic decision support tool for their own use but as a tool for nurses in their daily work and as a dashboard for management. CNEs demonstrated competency in the HIT decision-making process related to the evaluation, selection, deployment, and utilization, but the majority of the CNEs did not demonstrate competency to demonstrate an awareness of societal and technological trends, issues, and new developments as they relate to nursing

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [57], United States	To explore the attitudes of nursing home administrators and key managerial staff towards health information technology on the process of health IT adoption	Nursing home directors of nursing, case managers, nursing staff, kitchen staff, and administrative interns ($n = 42$) Primary sources of qualitative data are the administrators of the nursing homes	A qualitative case-study methodology Semistructured interviews based on the literature on health IT implementation in health care facilities and observer notes Inductive thematic analysis by integrating TAM and UTAUT model	Attitudes of nursing home administrators towards health information technology	The actions of the other nursing homes were seen as highly influencing social factors in managerial decision-making in implementing health IT. The administrator's conception of the potential benefits and usefulness of health IT was shown to support the procurement of technology adoption. Some nurse managers reported that without mandates from governments to adopt health IT, they have no intentions of health IT adoption and will have no systematic exploration of health IT implementations' positive effects on the quality of care and efficiency. Administrators' health IT implementation attitudes were affected by the price of the health IT system and the following upgrades on the computers and the staff training costs, the perception of staff's resistance to change, lack of strategic planning, evaluation, and cost-benefit analysis, the absence of regulatory pressures and satisfaction with current processes before the health IT. Administrators in nursing homes without health IT adoption had apathetic attitudes towards the change and innovation

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [2], United States	To explore how nurse managers use ICT to lead and communicate virtually in U.S. healthcare systems	Nurse managers of nursing service surgery line departments within a large, national healthcare system ($n = 16$)	A descriptive, exploratory qualitative design In-person, face-to-face interviews, a focus group, and survey questions on background information Statistical and inductive thematic descriptive analysis	Nurse managers' use of ICT in virtual leading and communication	Nurse managers are dependent on technology to complete all aspects of their tasks and communicate and organize. Nurse managers were often overwhelmed by the amount of emails, messages, software applications, websites, mechanisms, and devices needed to complete their tasks. Nurse managers called for personal mentorship and practical education on how to master technology use in their work effectively; they need to understand how to use the technology and the data it provides and to know how to apply the data for meaningful difference in organization and to impact patient care

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [51], Australia	To explore the perspectives of clinicians and service managers working in private mental healthcare regarding virtual reality (VR) use, including potential implementation barriers and facilitators	Clinicians ($n = 14$) and service managers ($n = 5$), aged 28–70 years working in a major private mental health hospital in Victoria, Australia	A qualitative study design Semistructured qualitative interviews Inductive thematic content analysis	The perspectives of staff in the use of therapeutic VR	To feel confident implementing VR technology, clinicians and managers identified knowledge and skills gaps; clinicians needed training in technical VR skills, assessing patient suitability, and managing ethical and safety risks, and managers needed “expert advice” to be informed about the evidence base, available hardware and software, training resources, and implementation strategies. Generally, clinicians and managers showed positive attitudes towards embracing new technologies. Staff perceived VR to be a relatively simple technology that clinicians and patients could easily learn to use, and some felt it makes clinical work easier. A service culture that values patient-centered care and innovation positively affected the staff’s overall positive attitudes to therapeutic VR. Perceived usability issues of VR systems were seen as barriers to their implementation

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [52], United States	To better understand direct care nurses and nurse leaders' perceptions of the barriers and facilitators that influence nurses' acceptance and use of remote visual monitoring (RVM) technology	Nurse leaders ($n = 6$) and direct care nurses ($n = 7$)	A qualitative descriptive study design Four semistructured focus group interviews (two nurse leader groups and two direct care nurse groups) Conventional content analysis	Perceptions of the factors related to nurses' acceptance and use of RVM technology	The content analysis resulted in five themes that addressed the barriers and facilitators to nurses' acceptance and use of RVM technology: (1) contextual human factors that impact nurse acceptance; (2) facilitators and barriers related to RVM's functionality; (3) nurse leaders' role in maintaining device availability and efficient use; (4) nurse leaders' role in promoting adoption of the technology; and (5) nurse leaders' role in valuing nursing professional judgement. Many leaders described advocating for RVM and providing education about the RVM protocol and its functions as ways to enhance its acceptance among nurses

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [53], Finland	To describe competence management in telemedicine from the perspective of health and social care frontline leaders	Frontline leaders from primary health care, specialised medical care, and social care (n = 10)	A qualitative study design Thematic interviews Inductive content analysis	Competence management in telemedicine	The interest and support of senior management were seen as important in telemedicine, and the role of frontline leaders is to support, encourage, and be positive and an example for the staff providing telemedicine. Leaders' positive attitude regarding technology and telemedicine was evident to be generally important, and leaders often run dedicated technology and telemedicine to give an example to professionals. When supporting the telemedicine provided by the professionals, leaders' characteristics such as credibility and easy accessibility were seen as important. Leaders perceived assessing professionals' competence in telemedicine to be challenging, but they recognised the different skills required for professionals in telemedicine. Good interaction between the leader and the professionals was seen as a key to successful telemedicine and competence management

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [55], Brazil and Portugal	To describe the potentialities and difficulties mentioned by nurse managers in the use of technologies in hospitals	Nurse managers (<i>n</i> = 71)	A descriptive-exploratory qualitative study design Semistructured interviews Thematic content analysis and work process theory	Potentialities and difficulties in the use of technologies	<p>The study pointed out that leaders need to be able to use different technologies simultaneously.</p> <p>Leaders pointed out that the use of technology is central to management planning and patient safety interventions and perceived that technology facilitates daily processes, communication, data collection, and the sharing of information and makes data more accessible. They highlighted the lack of training on technology and the challenges of time management in transforming data into information for decision-making.</p> <p>Leaders had time management challenges in the implementation of technology in nursing management work. They perceived that complete use of management technologies in hospitals is hindered by insufficient material resources and lack of functionality of technological instruments and saw a lack of interoperability between technological systems as a challenge. They also saw employees' lack of technology skills and knowledge as a challenge</p>

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [54], Norway and Finland	To map what experiences nurse leaders have encountered in connection with the change work that political decisions and reforms have created within the healthcare sector in the last 25 years	Nurse leaders ($n = 8$) from primary and specialist health services	A qualitative narrative study design Individual interviews with an open interview guide A four-step text condensation analysis	Experiences regarding the organizational changes	Leaders pointed out the lack of training in the introduction and use of equipment, as well as the need for training in the acquisition of computer systems and equipment. They perceived connecting and interacting on digital platforms as challenging. Leaders saw IT as a tool for acquiring new knowledge but reported having computer problems in everyday life
Reference [50], Indonesia	To explore the perceived core competencies of Indonesian first-line nurse managers within the context of the postpandemic era	Head nurses ($n = 7$) in a public hospital	A qualitative descriptive study design Face-to-face interviews Thematic analysis	Perceived core competencies	One of the four perceived core competencies was technological core competencies. Leaders perceived technological skills' improvement as a necessity and brought out the need to understand technology and how to use technological equipment, the knowledge how to use technological tools to support their work, and the need to understand online systems to be able to guide patients in their use. They also expressed the need to enable Internet access for nursing records and the ability to use information technology to find valid information. Leaders also brought out the need to participate in the creation and use of technology in management practices and pointed out that daily management relies on different technological tools and processes. Leaders reported having problems related to Internet access

TABLE 1: Continued.

Author(s), year, and country	Purpose	Participants	Methodology (design, data collection, data analysis)	Exposure of interest and outcome (PEO)	Key findings
Reference [56], United States	To investigate how nurse leaders experience using data to guide their inpatient staffing management decisions in the veterans' health administration	Veterans health administration nurse leaders ($n = 27$) across five management levels	A qualitative descriptive study design One-on-one, semistructured interviews Constant comparative method	Experiences in data usage for inpatient staffing management decisions	Leaders lacked the knowledge about data availability and perceived a lack of appropriate user education, guidance in the use of data, and support from their superiors. Leaders expressed that incomplete or inadequately aggregated data challenge the data usability and cause delays in data reporting. They also pointed out that data inaccessibility is a general challenge in the process. Poor system interoperability and data combination were reported as significant drawbacks

specialist, primary and private hospitals and health centers providing health and social care services ($n=4$), private hospitals ($n=2$), and a nursing home ($n=1$). Two studies [56, 60] included participants from national health management networks. The studies included a total of 1639 participants who were healthcare leaders in different positions and levels, such as nursing unit managers, executive directors, assistant executive directors, directors of nursing, head nurses, nurse managers, nurse leaders, charge nurses in managerial positions, service managers, frontline leaders, and chief nurse executives.

3.2. Healthcare Leaders' Experiences with Digital Competence Based on Qualitative Data Synthesis. The selected qualitative studies examined the following areas of digital competence: (1) the need for developing the leader's own, professionals' and patients' competence in the digitalisation of healthcare, (2) the leader's need for digital competence and expertise in the health IT implementation process, (3) positive perceptions towards technology, (4) negative perceptions towards technology, and (5) ability to act as an advocate to implement technology into practice (Table 2).

3.2.1. The Need for Developing Leader's Own, Professionals', and Patients' Competence in the Digitalisation of Healthcare. The first main category entailed the categories of knowledge and information needs in eHealth and health IT and the need for knowledge of the evidence base and regulatory expertise. In the study by Kujala et al. [58], leaders expressed that they cannot support their employees and patients without knowing about the new eHealth services. Leaders brought out their need to gain information and knowledge about eHealth services and their benefits and possibilities. Functionality, interoperability, usability of the eHealth services, and shortage of equipment and time resources generally in eHealth were considered challenging. According to Bezboruah et al. [57], leaders need to gain knowledge of health IT types and forms available, clinical and administrative health IT and their maintenance and potential exploitation in the facility, and health IT's challenges and benefits. They had concerns about customising the software functionality and choosing the right vendors for health IT. Moreover, leaders saw participating in technology development as one core competency area [50].

Leaders lacked knowledge about data availability and perceived there was a lack of appropriate user education and guidance in the use of data [56]. Leaders in the Bezboruah et al. [57] study lacked information regarding health IT software's usefulness, utility before, and ease of use after adoption. Insufficient information on health IT systems and their usage resulted in inadequate communication with the personnel and challenges in mutual understanding, which hindered health IT adoption. Gunawan et al. [50] report that leaders perceived technological skills' improvement as necessary. Leaders brought out the need to understand technology and how to use technological equipment, the knowledge of how to use technological tools to support their work, and the need to understand online systems to guide patients in their use. They also expressed the need to enable

Internet access for nursing records and the ability to use information technology to find valid information.

Leaders perceived that they must ensure the quality of new eHealth services [58]. In the Myllymäki et al. [53] study, telemedicine services were seen as the subject of continuous development from the leaders' perspective, so leaders evaluated telemedicine services regularly. Leaders also brought out the need to participate in creating and using technology in management practices [50]. They pointed out the lack of training in introducing and using equipment and the need for training in acquiring computer systems and equipment [54]. Leaders expressed the wish to learn new technical skills [58] and stressed the lack of skills as one reason for not using certain technologies [59]. Sharpp et al. [2] state that leaders felt that they were expected to be able to use new technologies without any introduction or training, and at the start of positioning as leaders, leaders were frustrated with learning and accessing technology. Leaders were generally confused with the number of mechanisms, websites, and software applications needed to complete their tasks. For example, to compile information related to patient safety, leaders need to access data from multiple technological sources. Additionally, Vandresen et al. [55] pointed out the leaders' ability to use different technologies simultaneously. In their study, leaders also highlighted the lack of training in technology and time management challenges in transforming data into information for decision-making. According to Simpson [60], most leaders cannot advocate for the nursing technology needs in the technology assessment process. Leaders saw that regular sharing of information digitally and in person and handling remote appointments are the primary methods they use in managing telemedicine-related knowledge [53].

Leaders stated that establishing and maintaining relationships was challenging when communicating virtually [2], as is to connect and interact on digital platforms [54], and they need to share information via WhatsApp and communicate in Zoom meetings [50]. Handling a significant amount of emails takes many leaders' time, which has been experienced as a hindrance to effective leadership. Multi-tasking was essential to keep on top of all the emails and text messages [2]. Leaders pointed out the need for expert advice about the evidence base, available hardware and software, training resources, and implementation strategies of virtual reality [51]. Leaders also stated that mentorship could ease their orientation with new technology [2], and they expressed the need to reach contact and responsible persons [58]. In using data, leaders expressed a lack of support from their superiors [56]. Lack of access to a helpdesk was seen as hindering video interpretation usage [59]. Organisations' strategic guidelines for telemedicine were perceived as a foundation supporting leaders' work [53]. Leaders were poorly informed about legal and ethical issues related to client data, information, and confidentiality [60]. According to Chung et al. [51], leaders perceived the need to develop specific strategies for promoting ethical and safe use of virtual reality. Leaders were unaware of the current evidence base regarding virtual reality [51] and lacked awareness of societal and technological trends, issues, and new developments related to nursing [60].

TABLE 2: Results of the content analysis of healthcare leaders' experiences with digital competence.

Sub-categories (<i>n</i> = 26)	Categories (<i>n</i> = 10)	Main categories (<i>n</i> = 5)
Need for information and knowledge about eHealth services		
Need for knowledge in health IT	Knowledge and information-related needs in eHealth and health IT	The need for developing leader's own, professionals' and patients' competence in the digitalisation of healthcare
Need to be able to evaluate digital service activities		
Need for training in technology	The need for knowledge of the evidence base and regulatory expertise	
Need to know how to communicate through technology		
Need for mentoring/expert advice with technology		
Need for legal and ethical competence		
Lack of knowledge on an evidence base		
Lack of implementation skills		
Lack of implementation knowledge	Lack of expertise in implementation	The leaders need digital competence and expertise in the health IT implementation process
Lack of motivation to implement health IT	Motivation and background in implementation	
Need to know how to plan and renew eHealth services		
Technologies are easy to use		
Technology is a valuable and practical tool	Positive usability experience	Positive perceptions towards technology
Openness towards technology	Positive impact of technology on activities	
Technology is necessary		
Technology improves operations		
Lack in IT functionality and material resources	Negative usability and accessibility experiences	Negative perceptions towards technology
Data availability problems	Encountering problems related to technological systems	
Poor interoperability of systems		
Challenges in data combining		
Need to have the ability to educate professionals about technology		
Need for guidance skills in eHealth	Training and guidance skills	Ability to act as an advocate to implement technology into practice
Need to take account of negative attitudes of professionals during implementation	Showing support and example	
Need to advocate for technology to professionals		
Need to support professionals with technologies		

3.2.2. The Leaders' Need for Digital Competence and Expertise in the Health IT Implementation Process. The second main category consisted of the categories needing more expertise in implementation, motivation, and background in implementation. Leaders stated the need to learn implementation and customer-centered development work and perceived themselves as needing help to plan the implementation of eHealth services [58]. To feel confident implementing virtual reality technology into the nursing practice, leaders recognise gaps in their skills and knowledge to be addressed [51]. According to Bezboruah et al. [57], some leaders implemented health IT in their institution without systematic planning before the implementation process, and in Kujala et al.'s [58] study, leaders perceived that eHealth service implementations were not monitored using measures. Leaders saw that they needed to participate in and support data integration [50] but had time management challenges in implementing technology in nursing management work [55]. Reluctance to change or limited information was the factor referred to when leaders did not implement health IT [57]. Leaders stated that institutional pressures influence health IT adoption, and some leaders said they would only implement additional health IT systems with mandates from the government [57]. Additionally, the process of implementing health IT tended to be imitated by successful counterparts. According to Simpson [60], leaders are knowledgeable in implementing information systems in the nursing practice environment. Still, in the study by Kujala et al. [58], leaders revealed their uncertainty in planning and renewing the eHealth services and operations.

3.2.3. Positive Perceptions towards Technology. The third main category consisted of categories' positive usability experience and positive impact of technology on activities. Leaders pointed out that technology is central to management planning and patient safety interventions [55] and saw IT as a tool for acquiring new knowledge [54]. Leaders reported using data for benchmarking, planning, and decision-making [56]. In the Mottelson et al. [59] study, leaders were generally satisfied with video interpretation and perceived that the technology was easy to use. According to Chung et al. [51], leaders stated that virtual reality technology is comparatively easy to master and perceived as simple. Leaders identified the potential of remote virtual monitoring to be a useful tool [52]. Also, in the Chung et al. [51] study, leaders saw virtual reality as a practical tool and positively accepted new technologies. Myllymäki et al. [53] reported that it is generally essential that leaders possess a positive attitude towards technology and telemedicine and that leaders' willingness to develop and reform telemedicine operations and their sincere interest in their employees promotes the development of telemedicine activities. Sharpp et al. [2] stated that leaders see technology as necessary for leading and cannot perform their tasks without technology. Leaders also pointed out that daily management relies on different technological tools and processes [50] and perceived that utilization and generation of data are necessary for adopting evidence-based practices [56]. Leaders saw that well-organised technology improves patient safety

outcomes, saves time and effort, and can help standardise competencies, introduce things, and improve communication [2]. In Vandresen et al. [55] study, leaders perceived that technology facilitates daily processes, communication, data collection, and information sharing, making data more accessible.

3.2.4. Negative Perceptions towards Technology. The fourth main category consisted of categories of negative usability and accessibility experiences and encountering problems related to technological systems. Leaders reported having computer problems in everyday life [54] and having problems related to Internet access [50]. Furthermore, they perceived that the complete use of management technologies in hospitals is hindered by insufficient material resources and a lack of functionality of technological instruments [55]. In the Wong et al. [56] study, leaders expressed that incomplete or inadequately aggregated data challenge the data usability and cause delays in data reporting. They also pointed out that data inaccessibility is a general challenge. Also, in the Vandresen et al. [55] study, leaders saw a lack of interoperability between technological systems as a challenge with using management technologies in hospital settings. Poor system interoperability and data combination were reported as significant drawbacks, according to Wong et al. [56]. In their study, leaders perceived the lack of intraorganizational harmonisation in software usage as a challenge in using data to guide inpatient staffing management decisions. They also saw that data system configurations challenged the timely addressing of events. Inconsistencies in data collection and reporting across different data tools were perceived to hamper effective decision-making in staffing management, as was data fragmentation. In addition, accumulating and compounding data from different data tools were experienced as time-consuming and challenging.

3.2.5. Ability to Act as an Advocate to Implement Technology into Practice. The fifth and final main category consisted of categories training and guidance skills and showing support and example. In Vandresen et al.'s [55] study, leaders saw employees' lack of technology skills and knowledge as a challenge. Kujala et al. [58] study revealed that leaders are concerned about training, engaging, and committing employees to new eHealth services. In the Hawksworth et al. [52] study, leaders saw providing education and advocating remote visual monitoring as a way to enhance its acceptance among professionals, and providing education about remote visual monitoring and advocating it to the professionals were also seen as patient safety strategies. Leaders brought out the need to guide professionals and patients in eHealth and felt that guiding different patient groups in eHealth is challenging [58]. Leaders also expressed fear of employees' resistance to change and negative attitudes regarding eHealth [58]. They felt they needed to consider employees' negative attitudes in the implementation process [51]. The leader's role includes explaining technology's effects on employees' workflow [52], and leaders often use technology

to act as an example for employees [53]. Advocating health IT systems' effective applications and functionalities to employees was hindered by the leader's lack of complete information on health IT systems [57]. Leaders' characteristics were seen as important in supporting employees in telemedicine, and good communication between leaders and employees was a key position in successful telemedicine actions [53]. Leaders' support and interest in telemedicine were seen as important for practice, and leaders' roles in telemedicine included supporting and encouraging employees, being positive, and acting as an example [53].

3.3. Healthcare Leaders' Digital Competence and Factors Associated with It Based on the Quantitative Data Synthesis. The selected quantitative studies examined the following areas of digital competence: "Use of information communication technology and computer skills [43]," "Knowledge of artificial intelligence and robot nurses [44]," "Attitudes about technology use [48]," "Informatics competencies [47]," "Technological competency as caring in nursing [45]," "Information system support for performance management [46]," and "ICT use [49]."

Data from the selected quantitative studies present that factors associated with the digital competencies of healthcare leaders include individual characteristics entailing the gender and age group, career characteristics entailing the education level, years of experience, employment position, experience in nursing administration, years of management and years of service and training entailing computer training before current status, information education/training, the experience of receiving education on caring in nursing, artificial intelligence and robot nurse courses, the experience that in-service training is constantly available, and the experience of having adequate in-service training to use information systems. Other factors associated with the digital competencies of healthcare leaders included, for example, technological knowledge, computer and software use and ownership, type of institution and speciality, user experience, and computer literacy (Table 3 and Figure 2).

From individual characteristics, gender and age are associated with the use of information communication technology and computer skills [43], knowledge of artificial intelligence and robot nursing [44], and attitudes about technology use [48]. It was evident that females' computer knowledge was lower than that of males, and the proportion of females not knowing how to use computerised patient monitoring systems was higher than that of males. Therefore, males' ICT ability was higher than females [43]. It is also evident that nurse leaders' age is significantly associated with the use of ICT; nurse leaders aged between 29 and 39 years were able to use ICT in nursing, while nurse leaders aged 50 years or older abilities were found lower, younger nurse leaders were more able to type using keyboards, use software applications for planning and making decisions, compose and send emails, use the Internet to locate and download items, and conduct other computer tasks compared to their older counterparts [43]. Ergin et al. [44] study presented a significant association between participants' gender and the belief that AI and robot nurses would be beneficial for

nursing, and it was evident that females believed that AI and robot nurses would be helpful for nursing. The study also found that older nurse leaders (aged 31–40) reported statistically significantly having heard more of the concepts of AI and robot nurses than younger nurse leaders [44]. Also, Martins et al. [48] reported that gender is significantly associated with the perception of utility and ease of use of different ICTs.

From career characteristics, education level is associated significantly with the use of information communication technology and computer skills [43], with informatics competencies [47], and with knowledge of artificial intelligence and robot nurses [44]. In the Adatara et al. [43] study, there was a significant association between nurse leaders' educational level and ICT use, and it was evident that nurse leaders with a bachelor's degree or higher education were using ICT in nursing care more than nurse leaders with lower education. In the Yang et al. [47] study, nurse leaders' education level significantly impacted their informatics competencies, which implies that a higher education level increases nurse leaders' informatics competency. Ergin et al. [44] found a statistically significant difference between the thought that AI and robot nurses would benefit the nursing profession and their educational level, presenting that nurse leaders with undergraduate degrees believed that AI and robot nurses would benefit nursing.

Experience (years/length) and the employment position were significantly associated with the use of information communication technology and computer skills [43], knowledge of artificial intelligence and robot nurses [44], and technological competency as caring in nursing [45]. Higher work experience in years was found to be a decreasing factor in ICT use among nurse leaders, and employment position has a significant association with leaders' computer knowledge, presenting that nurse leaders with higher positions have less computer knowledge compared to those with lower rank [43]. Ergin et al. [44] study presented a significant association between participants' seniority in the position and the employment position and the belief that AI and robot nurses would benefit nursing. It was evident that nurse leaders with 0–15 years of seniority in the position and position as ward supervisors believed that AI and robot nurses would benefit nursing. Additionally, the study presented a significant relationship between the idea that AI and robot nurses would replace nurses and nurse leaders' employment positions; ward supervisors did not think that robots would replace nurses [44]. Nakano et al. [45] reported a significant association between nurse leaders and nurses' technological competency in caring in nursing (TCCN). Their years of experience, presenting that a length of experience of five to less than ten years showed significantly lower TCCNI-R (Technological Competency as Caring in Nursing Instrument-Revised) scores than those with years of experience of 20 to less than 30 years.

Experience in nursing administration associated with informatics competencies [47]. This study showed that nursing administration experience negatively affects nurse leaders' informatics competencies, presenting that having more administrative experience is associated with lower

TABLE 3: Continued.

Factors	Outcomes								
	Use of information communication technology, computer skills (1)	Knowledge of artificial intelligence and robot nurses (2)	Attitudes about technology use (3)	Informatics competencies (4)	Technological competency as caring in nursing (5)	Information system support: assessing performance (6)	Information system support: managing resources (6)	Information system support: evaluation and reporting (6)	ICT use (7)
Ward supervisor	<i>n</i> = 108	<i>n</i> = 326	<i>n</i> = 138	<i>n</i> = 68	<i>n</i> = 96	<i>n</i> = 419	<i>n</i> = 419	<i>n</i> = 74	
Assistant head nurse		92.3							
Experience in nursing administration (years)				<i>p</i> < 0.0001					25.1
Mean (SD)				7.26 (4.66)					
Years of management			<i>p</i> = 0.0002						
Mean (min-max)			11.4 (6.9–30)						
Years of service			<i>p</i> = 0.0040						
Mean (min-max)			8 (7.8–35)						
<i>Training</i>									
Computer training before the current position	<i>p</i> < 0.0001								
Information education/training				<i>p</i> = 0.0010					
Experiences of receiving education on caring in nursing					<i>p</i> = 0.0020				
Taking courses about artificial intelligence and robot nurses		<i>p</i> > 0.0001							
Adequate in-service training to use information systems						<i>p</i> < 0.0010			<i>p</i> < 0.0010
Constant availability of in-service training						<i>p</i> < 0.0500	<i>p</i> < 0.0100		
<i>Other</i>									
Technological knowledge									<i>p</i> < 0.0010
Computer ownership	<i>p</i> < 0.0001								
Previous use of computers before appointment as a unit manager	<i>p</i> < 0.0001								
Hospital									
Type of institution									
Speciality			<i>p</i> < 0.0001/0.0040						
Social care			<i>p</i> < 0.0001/0.0020						
Experience of using systems (3–6 yrs)			<i>p</i> < 0.0001/0.0030						
Daily system use to facilitate follow-up						<i>p</i> < 0.0500	<i>p</i> < 0.0100	<i>p</i> < 0.0100	
							<i>p</i> < 0.0500	<i>p</i> < 0.0010	
									<i>p</i> < 0.0010

TABLE 3: Continued.

Factors	Outcomes								
	Use of information communication technology, computer skills (1)	Knowledge of artificial intelligence and robot nurses (2)	Attitudes about technology use (3)	Informatics competencies (4)	Technological competency as caring in nursing (5)	Information system support: assessing performance (6)	Information system support: managing resources (6)	Information system support: evaluation and reporting (6)	ICT use (7)
Good computer literacy	<i>n</i> = 108	<i>n</i> = 326	<i>n</i> = 138	<i>n</i> = 68	<i>n</i> = 96	<i>n</i> = 419	<i>n</i> = 419	<i>n</i> = 419	<i>n</i> = 74
Moderate computer literacy						<i>p</i> < 0.0500	<i>p</i> < 0.0500	<i>p</i> < 0.0500	<i>p</i> = 0.0030
Use of web technologies						<i>p</i> < 0.0500			<i>p</i> = 0.0030
Use of chat									<i>p</i> = 0.0290
Use of e-mail in management									<i>p</i> = 0.0260
Use of video conferencing in management									

1 = [43], 2 = [44], 3 = [48], 4 = [47], 5 = [45], 6 = [46], 7 = [49].

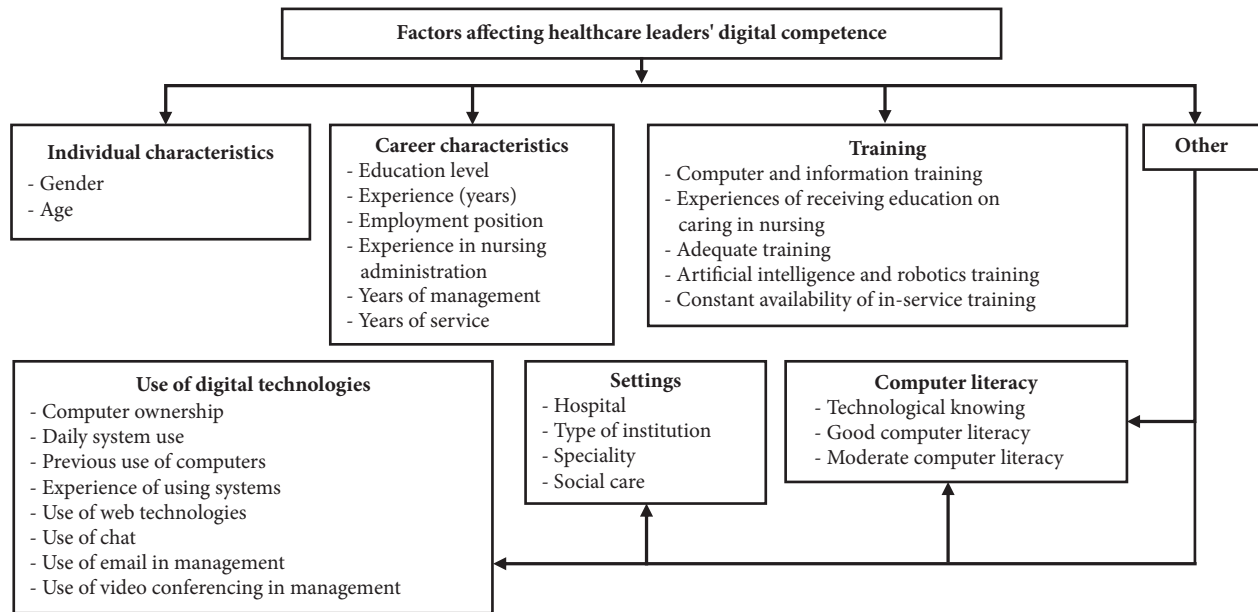


FIGURE 2: Factors affecting healthcare leaders' digital competence.

informatics competencies. Years of management and service are associated with attitudes about technology use [48]. Martins et al. [48] found significance in the perceived utility of the discussion groups, the time of experience in the services, and the usefulness of SINAI (a device to access information from other information devices) technology and time of experience in management. The results revealed that leaders with less time of service did not perceive the discussion groups as a useful tool, and this device was not considered useful among most leaders. Additionally, SINAI was also a technology not perceived as useful by leaders with less experience [48].

From training characteristics, computer training before the current position is associated with the use of information communication technology and computer skills [43], information education/training with informatics competencies [47], experiences of receiving education on caring in nursing with technological competency as caring in nursing [45], and taking courses about artificial intelligence and robot nurses with knowledge of artificial intelligence and robot nurses [44]. According to Adatara et al. [43], nurse leaders who had had computer training prior to positioning as a nurse leader possessed more knowledge of ICT use compared to nurse leaders who had not had computer training prior to the position and computer ownership and the use of computers before positioning as a nurse leader were factors influencing the nurse leaders usage of ICT. Yang et al. [47] study presented that nurse leaders' computer and informatics skills were lower than their informatics knowledge. In their study, it was evident that information education or training has a significant impact on nurse leaders' overall informatics competencies. In the experience of receiving education on caring in nursing, about half of the nurse leaders had partaken in an in-service educational activity on Technological Competency as Caring in Nursing (TCCN), and it was evident that nurse leaders were more

aware of the TCCN than the staff nurses [45]. In the Ergin et al. [44] study, there was statistical significance between the seniority and educational background and the status of taking courses related to AI and robot nurses, 0–15 years of seniority, and undergraduate degree. Saranto et al. [46] reported that the experience of receiving enough in-service training to use information systems was associated with assessing nursing performance and providing timely evaluation and reporting. Moreover, they reported that the experience of constant availability of in-service training is significantly associated with assessing nursing performance and managing resources.

From other factors associated with the digital competencies of healthcare leaders, hospital, type of institution, and speciality are related to attitudes about technology use [48], technological knowing associated with technological competency as caring in nursing [45], and computer ownership and previous use of computers before appointment as a unit leader associated with the use of information communication technology and computer skills [43]. In the perception of utilities and practicalities of different IT surveyed in the Martins et al. [48] study, the hospital type and setting were seen as significant factors, and it was evident that nurse leaders working in private hospitals perceived greater utility and ease of use of different ICTs, especially regarding e-mail, SINAI, and SISQUAL. For the perception of ease of use of e-mail, intranet, forum, Sape, Sonho, and Aida, and the perception of the utility of e-mail, discussion group, Sape, and Hepic having expertise was proven statistically important [48]. In the Nakano et al. [45] study, results from factor technological knowing showed that nurse leaders recognise the need-to-know patient needs through technology and provide care to the ever-changing patient condition more fully than the staff nurses. In the Adatara et al. [43] study, computer ownership and the use of computers before positioning as a nurse leader influenced

the nurse leaders' usage of information and communication technology.

In the Saranto et al. [46] study, good computer literacy and working in social care correlated positively with the three performance management information system features: assessing nursing performance and clinical procedures, managing resources, and providing timely evaluation and reporting. The statement "I use some systems facilitating follow-up of activity every day" is strongly associated with assessing nursing performance and managing resources, as 3 to 6 years of experience of using systems was negatively associated with managing resources. The study by Vaz and Landeiro [49] compared various technologies between the two groups of leaders from different settings (hospital center and nurse leader association). The use of web technologies, chat, e-mail, and video conferencing for any purpose, and management had statistical differences between the groups.

4. Discussion

This mixed-methods systematic review aimed to gather the most recent evidence on healthcare leaders' perceptions and experiences of digital competence and associated factors based on qualitative, quantitative, and mixed-methods studies. This review's results present that healthcare leaders' digital competence is a broad concept that includes and is associated by various factors. The original studies included in this review revealed that there is a clear need to develop healthcare knowledge and skills related to digitalisation, to improve their competence regarding digitalisation-related implementation competence, and to raise their level of education since it has been found to have an impact on their use of technology in healthcare settings.

According to the results of the qualitative analysis, there is a need to develop leader's own and others' competence in the digitalisation of healthcare since leaders expressed their knowledge and information-related needs in eHealth and health IT [2, 51–53, 57–60]. Leaders called for information about eHealth services [58], health IT [57], the ability to evaluate digital service activities [53, 58], the competence to communicate through technology [2, 53], and training about technology [2, 58–60]. Leaders also perceived that they need legal and ethical competence to acknowledge the regulatory issues in digitalisation [51, 60], and they brought out especially the lack of knowledge of the evidence base of the digital services and solutions [51, 57, 60]. Still, only a few studies included information about leaders' ethical competence in digitalisation, even though the knowledge of ethical concepts is a significant domain in digital competence [32]. Therefore, future research should aim to gain more information about leaders' ethical competence and legal aspects when utilising digital tools.

The results of this study support previous findings relating to leaders' need to receive continuous education. Training in digital health should emphasise competencies that are pertinent to specific groups of healthcare professionals, their roles, seniority levels, and work settings [32]. The enhancement of digital competence among healthcare

leaders necessitates collaborative efforts within government, educational institutes, professional organizations, and healthcare organizations. In order to produce a competent and relevant health management workforce, the current training and development directed for healthcare leaders at the organizational level and the review of higher degree teaching curricula to incorporate emerging digital competency requirements for healthcare leaders need to be changed. Reference [11].) Laukka et al. [18] conclude that leaders' education has not yet been modified to meet rapid changes in digitalisation. Therefore, leaders benefit from additional training or even participating actively in digital service development. Also, Laukka et al. [62] report that leaders may gain specific informatics skills and knowledge needed for decision-making regarding digital health services, for example, via education. In the study by Carson et al. [13], leaders' proficiency in using the EHR system was enhanced through training sessions. Strudwick et al. [10] present that healthcare organizations need to see leaders with specific informatics expertise as essential to effective health information technology decision-making, implementation, optimisation, and evaluation. Supporting leaders' digital competence development through continuous education accelerates advancement opportunities and assists in gaining an appropriate competence [5]. On this account, we recommend that the development of healthcare leaders' competence in technology use via various educational activities is necessary. Most importantly, we suggest that organizations should put effort on leaders' intellectual humility, curiosity, courage, and developmental maturity to enhance digital competence preceding concrete educational activities or training and to direct the necessary developmental activities to relevant leaders.

Our results implicate that healthcare organizations should put effort into implementing and utilising mentoring activities and expert advice [2, 51, 53, 58, 59]. The provision of mentoring and peer support also has the potential to enhance leaders' work well-being [63], yet further research on the suitable and effective mentoring methods and contents to improve healthcare leaders' digital competence is needed. Leaders' attendance in training or other methods of digital competence development is challenged by a lack of resources, such as time, expenses, or broader organizational support. Therefore, the organizations and work units should create more forceful structures and possibilities that enable the identification, evaluation, and development of leader's digital competence to encourage the use of digital technologies to their full extent and indicate a broader support system as the leaders themselves are mostly motivated towards the utilization of new technologies according to the results of our study. In a study by Kulju et al. [64], utilising a multimethod approach, supplementary materials, and opportunities for practicing new skills and exchanging experiences or inquiries seems to offer an effective strategy for delivering digital competence education to healthcare professionals. In light of our findings, we recommend that these factors could also be considered in training healthcare leaders to enhance their digital competence. Moreover, AI concepts should be woven into the curriculum of all

healthcare leaders' education programs to enhance the AI literacy and skills of leaders interacting with AI-based systems. This integration is crucial for organizations to enhance current working flow systems, navigate change, and effectively cultivate a culture that evolves with rapid technological advancements [24, 28, 65]. Yet, future research should focus on identifying the specific methods and their effectiveness on leaders' digital competence development, as there is a research gap in this area.

The analyzed qualitative research revealed that healthcare leaders need expertise in the implementation process regarding digitalisation in healthcare settings [51, 57, 58, 60] since leaders brought out the lack of implementation related skills [58], knowledge [51, 57, 58], and motivation [57] needed to implement the health IT into practice. The leaders' lack of motivation to increase the rate of use of health IT has also been recognised in other studies [66]. A review by Ingebrigtsen et al. [20] showed that leaders' IT knowledge positively affected information technology adoption. Their review presented that leaders possessing technical informatics skills and previous experience in IT project management are likely to develop a vision that creates long-standing engagement in the use of IT, are motivated in IT adoption, and are prepared for the adversities regarding implementation. Additionally, previous studies indicate that leaders' full engagement in digital health improves service implementation [62]. However, leaders need more support in role identification and do not understand the implementation procedure [67]. Senior leadership support is crucial for fostering a shared vision among various stakeholders and achieving the desired impact, for example, when implementing AI into healthcare [68]. As healthcare employees' technology acceptance, and thus indirectly their motivation to commit to the current work responsibilities, is reliant on the leader's digital competence [35], it is valuable to find relevant possibilities to improve healthcare leaders' skills, knowledge, and motivation when implementing digital health according to the findings of this review.

The qualitative synthesis revealed additionally that healthcare leaders need to be able to act as advocates to implement technology into practice [51–53, 57, 58]. According to the results, this calls for skills in training and guidance [51, 52, 58] and showing support and example to the employees by advocating for technology [52, 53, 57]. The importance of leaders' actions showing a good example to employees by using technologies in practice has also been evident in other studies [16, 18, 69] and sometimes providing training to the employees by acting as a teacher themselves [62]. Also, Kujala et al. [17] pointed out the frontline leaders' role in sharing the vision with the staff, involving them in the planning, and supporting their positive attitudes in eHealth services implementation. Our results also revealed the healthcare leaders' need to consider professionals' negative attitudes during implementation processes [51, 58], which is similar to the results by Laukka et al. [18]. As leaders' role in supporting digital technology implementation and employee's digital competence are inevitable, we suggest that leaders focus on supporting healthcare professionals through proactive mentoring to

ensure a digitally competence workforce and reinforce role clarity [70].

In our review's qualitative synthesis, leaders expressed mostly positive perceptions towards technology with experiencing positive usability of the technology [51–53, 59] and recognising its positive impact [2]. However, according to Sharpp et al. [2], leaders were often disconcerted by the variety of technologies to complete their tasks. They felt that they were expected to know how to use different technologies without introduction or training, which brought out feelings of frustration with accessing and learning technology, especially when starting in a leadership position. Laukka et al. [18] found similar results, that leaders sometimes feel digitalisation is stressful but also an easing element in their work. Moreover, in our study, leaders expressed negative perceptions concerning lack of IT capabilities and physical resources [50, 54, 55], data availability problems [56], poor interoperability of systems [55, 56], and challenges in data combining [56]. Issues with data interoperability and availability and lack of digital competence can induce several risks, such as endangering patient safety, delaying care processes, and challenging timely decision-making as part of managerial responsibilities. Therefore, we propose that leaders must be mindful of the various effects of digitalisation as part of their digital competence.

The analyzed quantitative data presented that leaders' age was significantly associated with their digital competence, implying that younger leaders could use ICT in nursing more than their older counterparts [43]. Moreover, leaders' educational level significantly impacted several researched digital competencies, implicating that higher education, more specifically, a master's degree, promotes leaders' informatics competencies [47]. Higher education positively impacts the use of information communication technology and computer skills [43], which supports our proposal for raising the healthcare leaders' educational level to increase their digital competence. Higher work experience in years was a decreasing factor in ICT use among nurse leaders [43]. More administrative experience was associated with a lower level of informatics competencies [47]. We suggest that there is a need to pay attention to developing the more experienced and older leaders' digital competence, for example, through reverse mentoring, since according to previous research, reverse mentoring is considered an effective approach in developing the senior employees' up-to-datedness with technology [71, 72]. This can potentially support the leaders' work well-being, satisfaction, and effective functioning in digitalising healthcare in their remaining years of practice yet factors such as authoritative leadership styles in different cultures may challenge the implementation of reverse-mentoring.

The quantitative data also revealed the impact of gender on the digital competence of healthcare leaders, as the results show that females' digital competencies, more specifically in computer and patient monitoring system knowledge, are generally lower than males' [43]. On the other hand, results from Ergin et al. [44] show that females are more optimistic than males about the impact of AI and robot nurses on nursing care. Moreover, one study concluded that female

leaders are more heavily influenced by the utility and ease of use of different ICTs [48]. In light of these findings, we recommend paying particular attention to developing female leaders' technological know-how yet means to change the attitude environment relating to the use of new digital solutions should be targeted more vigorously towards male leaders. Still, more research on the effect of the leader's gender on digital competence on a wider scale is needed.

5. Limitations and Strengths

Our review has some limitations. In our review, we found only one study referring to the digital competence of nurse managers in social care [46]. Therefore, our results refer only to the digital competencies of healthcare leaders. Some of the relevant studies regarding our inclusion criteria may have been left out of this review even with the systematic process to prevent publication risk and even though we searched four databases and checked the reference lists of the included studies since we left out the grey literature and limited the timeframe and language to English or Finnish. In this review, conducting a meta-analysis was impossible; however, tabulation and data synthesis supported the reliability of the presented data of the chosen studies. Each chosen study's quality assessment uses the JBI quality appraisal tool. One study [59] scored lower than 50% in quality assessment but was still included in the final data synthesis. The sensitivity analysis by excluding that one study was not possible according to the chosen data synthesis methodology. This review summarised the results of studies conducted in different countries. There may be differences in the digitalisation of social care and healthcare between these countries, which need to be recognised in results' generalizability. The PRISMA 2020 statement: a guideline for reporting systematic reviews was used to increase the transparency of this report [73].

6. Conclusions

The results of this review indicate that healthcare leaders must possess a wide range of digital competencies to work effectively in the constantly developing healthcare environments. Considering the geographical diversity of the articles incorporated in our review, we can infer that the digital competence of healthcare leaders holds worldwide significance in healthcare management. The research discussed in this review suggests that developing and supporting leaders' digital competencies should be considered in healthcare organizations, research, and education to meet the demands of increasingly digitalising healthcare development work. We see leaders' mainly positive attitudes towards digital competence as a favourable factor for their competence development. So, we are suggesting that leaders should embrace an active role and take responsibility in actively seeking opportunities where their digital competencies can be improved. Simultaneously, leaders should be mindful of the pitfalls of digitalisation's effects and challenges and reflect these aspects as part of their digital competence. We suggest that to increase healthcare leaders'

digital competence, healthcare organizations should prioritise the development of policies, structures, and processes to ensure effective design, planning, and implementation of innovative adoption while also dedicating financial resources to support management workforce development.

We also propose that healthcare organizations should develop different models and practices to reinforce and transfer leaders' digital competencies through various activities. In-house training should focus on the specific digital systems to be implemented in the organization before their roll-out, and continuously available user support should be provided. The training should aim to increase healthcare leaders' digital skills needed in their daily work and a comprehensive understanding of the benefits and disadvantages of digital tools in supporting patient-centered, effective, and evidence-based care in digitalised healthcare. Prior to education, leaders' developmental maturity should be investigated to avoid potential waste or inefficient use of resources. We propose that data interoperability and accessibility issues be identified and resolved at the organizational level to help healthcare leaders work in digital environments. As our results showed, leaders' education level significantly impacts their digital competencies, and digital competence should be considered in the curriculum of healthcare leaders. With the increasing use of AI in healthcare, we see that the AI perspective needs to be taken into account as part of healthcare leaders' digital competence, both at the educational and organizational level. In terms of further research, more information is needed on leaders' ethical and legal competencies as part of digital competence and the complexities of introducing AI-based systems to healthcare practice. We also recommend future research to investigate interventions that can support digital competence development of more mature leaders effectively and comprehensively since their digital competencies were found to be lower than those of their younger counterparts.

Data Availability

All data generated in this study are presented in this article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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Supplementary Materials

Supplementary file 1. Search strategies used for all four databases (PubMed, CINAHL, Medica, and Scopus) to retrieve the relevant, original studies. Supplementary file 2. Assessment according to the JBI Critical Appraisal Checklists of the methodological quality of the included studies ($n = 19$). (*Supplementary Materials*)

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Research Article

Digital Transformation Led by Nurses and Nursing Managers' Priorities: A Qualitative Study

O. Navarro Martínez ¹ and J. M. Leyva-Moral ²

¹University of Valencia, Faculty of Nursing and Podiatry, Nursing Department, Valencia 46010, Spain

²Autonomous University of Barcelona, Cerdanyola del Vallès, Barcelona 08193, Spain

Correspondence should be addressed to O. Navarro Martínez; olga.navarro@uv.es

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Nurse-led digital transformation promotes nurses' participation and leadership in digital health. It also aims to improve the quality of care and patient satisfaction. The objective is to describe the priorities of nursing managers in the field of digital health and their beliefs related to the digital transformation led by nurses. The methodology used is a qualitative-descriptive study. The data were collected by means of the implementation of playful-reflective workshops. Open and/or closed questions were used, to which participants responded using their mobile phones, by capturing QR codes. A group of 32 nursing managers from the Spanish private hospital sector were invited to participate by means of purposive sampling. Data were analysed using the Braun and Clarke thematic analysis performed by two researchers independently. Of the 32 participants, 25 were women. The average age was 38 years. The main utility of the use of technology in health environments that they noted was innovation, followed by communication. Another utility mentioned repeatedly was that of visibility, considering digital media as a way to show the population the role of a nurse. They also noted time savings and error reduction. Moreover, as barriers to the implementation of technology, participants pointed out the lack of skills or equipment, institutional support, and the care burden. This study shows that nursing managers are aware of the need and benefits that nurse-led digital transformation can bring about. These findings can pave the way for promoting a nurse-led digital leadership culture.

1. Introduction

Digital health or e-health is not only a trend or a fashion but also a necessity that healthcare professionals must incorporate into their daily practice to establish new channels of communication with the patient and society, as well as to maintain lifelong learning and build knowledge with other professionals and institutions globally [1, 2]. Digital health is defined by the WHO as the cost-effective and safe use of information and communication technologies in support of health and related areas, including clinical care services, health surveillance, health literature and health education, knowledge, and research [3]. In this regard, public and private organizations implement e-health systems in health centres and among health professionals as a way to reach the patient, save costs, streamline procedures, etc. [4–6]. The

benefits of digital health for patients have been promoted in numerous publications in recent years, either in the form of exchange communities [7–9] or at the individual user level [10–13]. Digital health literacy can be seen as a useful tool for health education, promoting healthy lifestyles, reducing complications, or monitoring patients with chronic diseases [14, 15]. This is especially relevant in times of uncertainty like what happened during the COVID-19 pandemic, where not only cost reduction or immediacy was crucial but also protecting patients by minimizing unnecessary visits to health centres was crucial [16, 17]. In this sense, authors such as Fronczek et al. consider that the arrival of the pandemic has nurtured nurses' use of the Internet and social networks as an amplifier of their voice, a way to reach communities easily and quickly, influence health policies, and exercise active leadership [18]. In fact, nurses are in a privileged place

in the health system because they are the most numerous professionals in all health systems worldwide and have an important role in patient education and follow-up. Nurses, through their work, contribute to improving patients' ability to understand and use health information for their own health [19]. However, while the use of digital media implies a proactive and positive attitude, it also requires training; few healthcare systems are committed to the lifelong training in digital skills [20] although successful implementation requires, especially, institutional support [21]. The incorporation of technology in patient care is the responsibility of the system as a whole and cannot depend only on the goodwill or interest of professionals, and it must be supported by institutions and collegiate organizations, as well as regulated by the state at a higher level and included in the national curriculum [21, 22]. We have rephrased the sentence "This is especially relevant . . . health centres was crucial" for clarity. Please confirm that this is your intended meaning.

Nurse-led digital transformation (NLDT) is an approach that focuses on the participation and proactive leadership of nurses in all facets of digital health [23]. This transformation is a journey of improvements and changes that focus on patients, practice, and education. NLDT incorporates digital tools to improve the quality, safety, and integrity of nursing care. This includes the use of innovative technologies such as robotics, telemonitoring, and the use of mobile applications or devices to improve the quality of nursing care [24]. Therefore, this digital transformation aims to improve the quality of care and it increases patients and nurses' satisfaction [25].

In Spain, it is known that the lack of institutional support is an important barrier when applying technology in nurse practice [20]. Internationally, several authors also point to healthcare organizations as responsible for facilitating resources and spaces for the use of technology, as well as providing healthcare professionals with the time and opportunities to learn how to use them [21]. This is especially relevant for nurses who have not received training in this area during their undergraduate studies [22]. As our previous studies were based on nurses without management positions, we consider in this case that the institutions are led and managed by managers, and therefore, it is interesting to know their vision on this issue. However, the beliefs of nurse managers regarding digital transformation and the professional use of such technology are not well known yet. Therefore, the objective of this study is to describe the phenomenon of digital transformation led by nurses from the perspective of nursing managers. A detailed understanding of this new area of nursing will identify barriers, limitations, facilitators, and possible applications, helping to offer possible solutions to integrate technology in the field of care. This study is a starting point when focusing on identifying the weaknesses and strengths of NLDT. Only by being aware of these limitations will nurses be able to advance in professional development, including care in the digital world as part of new skills [26].

2. Materials and Methods

2.1. Study Design. This study used a qualitative-descriptive design. This type of study provides a detailed description of the bias aspects of events or experiences from a subjective perspective [27]. In addition, a qualitative-descriptive design allows capturing the richness and complexity of the phenomenon under study [28] and provides a complete and detailed description of a phenomenon without extensive interpretation or theorization [29]. The research followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) [30].

2.2. Participants and Instruments. The study involved nursing managers from private hospitals in Spain. Their participation formed an integral component of a voluntary training initiative offered by their respective institutions. The present study undertook a qualitative examination of the data collected, specifically pertaining to the digital transformation spearheaded by nurses. The data were collected through the facilitation of playful-reflective workshops. These workshops were designed as collaborative workspaces, engineered to foster collective engagement and reflective inquiry within work-play-reflection sessions. Such sessions are meticulously structured, incorporating a diverse array of participatory tools [31], with group dynamics and techniques meticulously tailored to align with a central theme and objective [32]. Both open-ended and closed-ended inquiries constituted the framework for data elicitation, with participants leveraging their mobile devices to respond via a QR code embedded within the presentation materials. Further elaboration on the utilized tools and their respective functionalities is detailed in Table 1.

Table 2 shows the questions asked, as well as the tool used, and a brief explanation of the mode of question or activity used. The questions included in this study are of our own elaboration, based on the results obtained in previous studies. For the questions about competencies, the authors have followed the digital competency framework established by the Spanish Ministry of Education [33].

This type of tool has already been used in previous studies in qualitative research contexts for the collection of opinions and generation of subsequent debate among professionals [34–36] and also with patients [37].

For ideas and the generation of group work, Miro is a useful option to foster collaboration among students, giving them a workspace to generate ideas freely and share resources [38]. In addition, Miro boards encouraged creativity and promoted a collaborative, meaningful learning experience [39]. Each response was coded by assigning a number to each participant to make it easier to work with the data.

2.3. Data Collection. The health system in Spain is a system in which public hospitals (financed 100% by the State) and private hospitals (financed by private capital) coexist and even collaborate. These private hospitals serve patients who

TABLE 1: Tools used and functionality.

Digital tool	Justification and usefulness
Slido https://www.slido.com/	This tool allows you to make questionnaires with different types of questions that can be answered interactively from a mobile phone. In this case, it was used to collect open answers. The answers are obtained anonymously and are displayed on the classroom screen, which allows interaction and discussion later during the session
Mentimeter https://www.mentimeter.com/	This tool also allows interactive questionnaires that attendees can answer from their phone. The questions used in this case were the word clouds (to start a topic or extract information about what most interests the group), test questions, and the visual scale (to perform group comparisons)
Miro https://miro.com/	This tool allows working in groups visually using brainstorming techniques, design thinking, canvas model, etc. In this case, brainstorming was used for collecting group ideas and later the bull eye diagram for prioritizing ideas

TABLE 2: Questions and modality used.

Question	Tool and type of question
<i>Applicability of technology in nursing</i>	
In short, what can technology be useful for?	Mentimeter Word cloud
What is nurse-led digital transformation for you?	Slido Free written reply
What possible uses could we give to technology in your hospital/service?	Miro Group brainstorming and brainwriting
Which of these ideas would you carry out first because you consider it a priority?	Miro Bull eye diagram for prioritizing ideas in a group
<i>Digital skills of nursing managers</i>	
I would say that I manage (on a scale of 5 points, being the worse mark—1 and the best mark—5) in:	
(i) Social networks	Mentimeter
(ii) Searching for quality information	Likert scale
(iii) In content creation: videos, blogs	
(iv) Safety issues in the network	
Which of the digital competences do you consider most useful for nurses' functions?	Mentimeter Sort through
<i>Constraints, barriers, and future expectations</i>	
If you could have super digital power, what would it be?	Mentimeter Short answer
Are nurses prepared to care in technology? (yes/no/I don't know)	Mentimeter Test type question
What barriers or limitations do we have to apply technology as a collective/individual level?	Mentimeter Short answer

pay to receive benefits and patients referred from the public system who do not pay to receive assistance, due to agreements with the State. Private hospitals in Spain represent 56% of all hospitals. The data collection phase was overseen by the principal researcher, a female PhD holder, who assumed the role of instructor during the face-to-face course conducted between November 2022 and January 2023. These instructional sessions were held within the academic confines of a university situated in Madrid. Engaging in this initiative were nursing managers actively partaking in a voluntary lifelong learning endeavor facilitated by their respective private hospitals spanning Spain. Noteworthy is the diverse spectrum of professional

experience exhibited by these nursing managers in their roles. The duration of the session extended to four hours of intensive face-to-face training. Participants were apprised at the outset of the training regarding the qualitative analysis awaiting their submitted exercises, integral to the current study. Full elucidation regarding the study's objectives and procedures was provided. Participants were accorded the autonomy to determine the inclusion of their exercises in the study, with no repercussions ensuing from their decision. It is worth noting that all participating nursing managers consented to and expressed satisfaction with the incorporation of their exercises as primary data for this qualitative inquiry.

Data collection ended once the data saturation was reached [40]. Data saturation in qualitative research refers to the point at which gathering additional data no longer yields new or insightful information or perspectives related to the research questions or objectives [41]. It signifies that the researcher has obtained a comprehensive understanding of the phenomenon under investigation, and further data collection would not contribute substantially to the richness or depth of the findings. In practical terms, reaching data saturation implies that recurring themes, patterns, or categories have emerged consistently across the collected data, and new data points are unlikely to introduce novel insights or perspectives [42]. In the context of this study, which involved the analysis of exercises created by participants in a leadership workshop designed for nursing managers, saturation manifested in a manner that differed from the conventional paradigm. Saturation was deemed to have been achieved when the exercises ceased to proffer novel insights, and the analytical process left no inquiry or reflection unaddressed.

Prior to the face-to-face sessions, detailed information on the study was provided to participants by e-mail. Those who agreed to participate received new written and oral information and were given a space to clear up any doubts before signing the informed consent. Participants did not receive financial compensation for their participation. No data were collected that could reveal the identity of the participants. The data were treated confidentially with access only to the investigation team. The study was conducted according to the ethical and legal rules of the Declaration of Helsinki and the Good Clinical Practice of the European Union. This project was approved by the Ethics Committee of the Catholic University of Valencia with the code UCV/2022-2023/001. None of the invited participants refused to participate or dropped out.

2.4. Data Analysis. The research team entered the data into a database for subsequent thematic analysis, following the method proposed by Braun and Clarke [43]. For a correct triangulation of the data, that is, to verify and compare the information obtained by collecting data in different methods and sections [44], the textual elements were reviewed, and their categorization was carried out, later, by a second researcher. In this way, data analysis expanded, deepened, and reduced the possibility of misunderstandings, thus clarifying the meaning and veracity of the information obtained in the testimonies. Finally, the resulting report was discussed with the research group and, through reflective thinking and critical reasoning, changes were made until a consensus was reached.

2.5. Rigour. To ensure the credibility, transferability, dependability, and confirmability of the study, Guba's criteria were meticulously applied throughout the research process. This involved a collaborative effort between two experts well-versed in e-health and qualitative methods. Each expert independently reviewed the assigned codes, themes, and interview quotations, with any discrepancies resolved

through discussion. Additionally, to mitigate the risk of misinterpretation, a native editor/translator conducted backtranslation. Continuous discussion and reflective thinking among all researchers at every stage of the study contributed to its rigour, credibility, and overall trustworthiness.

The methodological strategies employed in this study aligned with established practices for data trustworthiness, encompassing an audit trail, bracketing, coding checks, categorization, continuous feedback, ongoing data interaction, participant confirmation, peer debriefing, structural corroboration, and referential adequacy [45, 46]. The iterative process of data translation involved persistent discussions within the research team to safeguard data integrity [47]. Upholding the authenticity of meaning during dissemination [48] was ensured through the rigorous review of source and target language codes, categories, and exemplar quotes by three external bilingual experts. Additionally, the study's credibility and consistency were maintained by providing a detailed description of the data collection process and documenting results with quotations from the transcripts. Furthermore, findings underwent scrutiny and verification through consensus meetings involving the research team and two experts specializing in qualitative research and gender identity issues.

3. Results

Thirty-two nursing managers from private hospitals participated, of whom 25 were women. The average age of the participants was 38 years old. The centres in which they work are located in different geographical areas of Spain: Andalusia, Valencia, Catalonia, Madrid, Canary Islands, Basque Country, and Galicia. Thematic analysis of the data identified four themes:

- (a) Utility and concept of NLDT
- (b) Essential and advanced digital skills
- (c) Barriers to NLDT
- (d) Immediate applicability of the NLDT

This is a group of participants who identify themselves as users with moderate-advanced skills in the use of social networks and in the search for digital information, with moderate-competence in digital security issues, which are self-described as beginners in the field of digital content creation.

3.1. Utility and Concept of NLDT. From the speeches of the participants, the digital transformation led by nurses could be defined as the set of digital tools that allow nurses to facilitate their daily work, especially in the area of communication and improvement of clinical records, which is beneficial for both patients and professionals. The main utility attributed to the use of technology in healthcare environments is innovation, mainly associated with communication. The technological tools are described as elements that allow a rapid and agile dissemination of information, thanks to which it is possible to unify criteria

that allow the progress of the implementation of unified registries. In short, according to the participating nurse managers, the use of information technologies allows them to give visibility quickly and effectively to certain interventions that, indirectly, improve professional and patient safety and contribute to optimizing key resources such as time.

Figure 1 shows an example of a word cloud, in this case, related to the question of the usefulness of the technology.

“I believe [NLDT] is the development and application of digital media in the world of nursing. It is that the staff of the world of nursing can create, develop and give visibility to our collective and serve us as a working tool.” (Participant 3)

“[NLDT] is the application of new technologies integrated into nursing work as a vehicle for improvement and innovation. It consists of adding digital tools to our work to improve results and communication.” (Participant 11)

One of the benefits that also emerges recurrently in the responses of the participating nurses is the visibility of the profession, considering digital media as a way to show the population what the role of the nurse is and strengthen their professional identity.

“[NLDT] is giving more vision to the profession through digital media.” (Participant 7)

“[NLDT] is to bring the nursing world to users through the digital world, publicising the work of the nurse.” (Participant 8)

3.2. Essential and Advanced Digital Skills. In the workshops, participants were asked to agree on the essential digital competence for the professional performance of nurses. Communication is again identified as the first option, accompanied by collaborative actions. The group then decided that the next essential digital competence for nurses was information and digital literacy, and ultimately skills related to solving technological problems, Internet security, and digital content creation.

“[NLDT] is a change in management by means of digital platforms or applications to facilitate access to everything, being nurses who guide or define users’ needs.” (Participant 2)

“We need to have digital tools for the day to day of our profession and update the practice of nursing and new technologies.” (Participant 9)

These results make sense when the group is asked to discuss which area they would like to have advanced skills. In this case, it highlights the need to improve the use of computer programs, create apps, solve technical incidents, and know how to create digital content.

“[I would like] to have more knowledge in the field so that I can put it into practice and teach others.” (Participant 13)

“[I would like] to create apps that I can use in my daily practice of my profession.” (Participant 22)

3.3. Barriers to NLDT. The barriers identified by the group for the regular use of digital technology for nurses were mostly ignorance or lack of the necessary tools and skills. The participants point out that they do not have a favourable infrastructure, which also refers to institutional culture and the feeling of belonging to the institution. In this respect, they indicate that an adaptive process is necessary to allow the incorporation of these new competencies but that the current reality of the system and the age of many professionals do not ease such adaptation. Similarly, a considerable number of participants indicated that the current care burden is not compatible with the acquisition of new skills such as ICT.

“Having an idea, but not knowing how to develop it due to a lack of knowledge of technological management. In addition, there is a lack of computer devices in the workplace to enable their development.” (Participant 17)

3.4. Immediate Applicability of NLDT. As participants engaged in lively brainstorming sessions, the rich tapestry of ideas surrounding the integration of digital technology within hospital environments began to unfold. A plethora of insights, totalling over 150, emerged, encapsulating the collective wisdom and foresight of nursing managers. Amidst the flurry of ideas, several overarching subthemes emerged, shedding light on the multifaceted potential of digital innovation in healthcare settings. From the efficient management of personnel to the seamless integration of newcomers, participants envisioned a future where digital solutions would revolutionize the administrative landscape of hospitals. In the realm of patient care, the concept of geolocation and waiting time optimization emerged as a central theme. Participants passionately discussed the possibility of utilizing digital tools to enhance patient tracking and streamline waiting times, thereby ushering in a new era of efficiency and patient-centred care.

“I’ve been considering the advantages of a mobile app for tracking patients in the hospital. It could provide peace of mind to families by updating them on their loved one’s location, whether in the ER, getting X-rays, or in surgery, fostering a deeper sense of connection and support.” (Participant 15)

“I’ve been reflecting on ways to improve patient admissions at our center. Imagine the convenience of bypassing long queues with a robotic admission system or similar technology. It has the potential to transform the patient experience, minimizing wait times and streamlining admissions for a more efficient process.” (Participant 23)

implementation of technology. Along the same lines, there are authors who point to collaboration as a driving force behind the adoption of digital tools [49–54]. It is evident, therefore, that communication and digital collaboration are competencies considered fundamental for nurses nowadays since they can allow them to advance in their professional and personal development. This could be due to the infinite possibilities offered by social networks and digital tools in a globalized and connected world to contact other professionals and learn from these exchanges. However, it is important to bear in mind that a significant digital division remains and that there may be significant differences due to generational, cultural, or even resource availability issues.

In this study, we observed how participants consider the use of technology as a priority for monitoring and follow-up, improving management, process performance, quality, and safety. These benefits coincide with those already obtained in other studies on this subject [55] and with publications that indicate that nurses need these skills to provide safe care to patients [22, 56]. It is clear that these benefits and concerns regarding the quality and safety of patients are a common point among management nurses, regardless of the context in which they work.

As shown in this research, nursing managers highlight barriers to the use of new technologies such as a lack of skills, as well as the high care burden and lack of institutional support. These reasons have already been contrasted in another previous research carried out by the authors in similar contexts [57]. Some authors also mention possible causes such as professionals not integrating ICT in their practice, a lack of time [58] as well as a lack of digital skills and competencies [59, 60]. The lack of institutional support and the low level of training that professionals receive make the gap between the demand of the population and the supply by health workers even more complex [21]. In the specific case of Spanish nurses, the lack of time is a real problem as it is far below the ratio of other countries according to the WHO, the OECD, and the General Council of Nursing [61].

It is interesting to note that, in this study, nursing managers consider the use of digital tools to accompany and train new nurses entering hospitals very useful. According to Sharpp [62], these tools would be an engine to generate motivation and even boost new leaders: leaders who promote relevant changes, bearing in mind that true leadership is someone capable of creating healthy work contexts, promoting self-efficacy, and motivating nursing leadership [63]. However, the state of digitalization in health varies considerably between European countries [64]. In Spain, only 44% of studies in nursing include training in digital competence in their curricula [1]. In other countries, such as Finland, public guidelines have been implemented in this area since 2015, helping to improve the level of digital competence of nurses [56]. Therefore, it would be advisable to have educational policies that integrate this competence transversely and continuously in the training of future nurses.

This research shows that nurse managers do not usually create digital contents and that they do not have competence in this area although they would like to have them as they

consider them useful. Along the same lines, a quantitative report was published by the Signo Foundation in health managers in Spain [65]. This report also noted the participants' low content creation competence although in this case, only 12% were nursing managers. In this regard, Korte et al. also referred to the importance of nursing managers to generate engagement in the implementation of new technologies. In fact, this author points out that *Management actions can provide a structural framework and training so that nursing leaders can ensure their staff's engagement in using unknown devices, too* [53].

It is important to note that digital resources are powerful tools for the monitoring of people with chronic pathologies [66], and they can be used to understand the behaviour of patients in relation to health [67, 68] and be useful to educate the population and offer quality healthy advice [69]. Some authors, such as Rubel [70], insist on the need for professionals to lead the creation of quality content for patients, thus avoiding misinformation. However, the authors consider it essential that patients actively collaborate in this process of creating digital educational content, as other authors have [71].

This study presents a number of limitations that must be taken into account. The main limitation that can be cited in this study is the collection of data in groups. This data collection technique has advantages and disadvantages that should be assessed by the research team. In this case, we opted for group techniques given the active and creative dynamics of the activities, always looking for a summative discourse. With all participants holding similar positions, it was thought that there would be no hierarchical differences limiting speeches. The fact that all participants were managers in private institutions could also be indicated as a limitation. However, the fact of coming from different geographical locations within the country brings considerable richness to the data since the experiential discourse becomes summative given its heterogeneity. It is important to note that 78% of the participants in this study are women, which may not represent the reality of other institutions or geographical areas. According to WHO, only 25 per cent of senior positions in health organizations are held by women nurses [72].

5. Conclusions

This study shows how nursing managers value the NLDT positively. In fact, they consider digital tools to be useful for improving the safety and efficiency of nurses' work and, in addition, they underline their impact on improving the visibility and recognition of the profession at a social level. Along the same lines, managers consider that the most important competencies for the nursing profession are communication and collaboration. Despite the managers' identification of all these positive factors, they also mentioned factors that hinder digital leadership, such as the lack of digital competencies, the high burden of care, and the lack of institutional support. It is expected that the results obtained in this analysis will be useful to establish a basis for future studies, which could include mixed methodologies

with a multicentre approach to identify and understand the barriers and facilitators faced by nurse managers when implementing technology in clinical services. This could be the starting point for educational, institutional, and monitoring proposals for technology integration to promote digital transformation and nurse leadership in this area. The nursing manager must be sensitive to NLDT, focusing on care, also in the digital environment, on professional-patient collaboration, giving the latter a leading role. Therefore, we recommend the use of participatory action research and other participatory qualitative methods by managers and nurses when designing materials, resources, and campaigns in the digital and technological environment.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure

No artificial intelligence tools or applications have been used in this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Research Article

Disruptive Behavior and Factors Associated with Patient Safety Climate: A Cross-Sectional Study of Nurses' and Physicians' Perceptions

Pedro Moreno-Leal ¹, César Leal-Costa ², José Luis Díaz-Agea ²,
María de los Ángeles Castaño-Molina ², María Belén Conesa-Ferrer ²,
and Adriana Catarina De Souza-Oliveira ¹

¹Catholic University of Murcia, Faculty of Nursing, 30107 Guadalupe, Murcia, Spain

²University of Murcia, Faculty of Nursing, 30120 El Palmar, Murcia, Spain

Correspondence should be addressed to César Leal-Costa; cleal@um.es

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Background. Few studies have analyzed the negative outcomes of disruptive behaviors in the nurse-physician relationship in patient care and their impact on patient safety. These multicausal studies significantly relate to organizational, institutional, and professional attitudinal risk factors. **Aim.** Analyze healthcare professionals' perceptions of disruptive behavior and factors associated with patient safety climate in the nurse-physician relationship at the hospital level. **Methods.** A multicenter cross-sectional study was conducted with a sample of 370 nurses and physicians assigned to different public hospitals in the Murcia/Spain region, applying the adapted and validated Spanish version of the Nurse-Physician Relationship Scale: Impact of Disruptive Behavior on Patient Care. The analysis used proportions or means (standard deviation (SD)), univariate and multivariate linear regression models, and the chi-square test. **Results.** Disruptive behavior was more prevalent in the ICU (81.6%) and the emergency department (67.8%). Professionals indicate that fear of reprisals is the main barrier to the reporting system. Likewise, stress and frustration are more associated with disruptive behavior and influence the safety climate. **Conclusion.** Professionals indicate that disruptive behaviors can have a negative impact on clinical outcomes. Age and type of service were identified as the most relevant socio-occupational factors. Stress, frustration, and communication problems are the factors that most influence the safety climate.

1. Introduction

The healthcare industry is considered one of the most complex sectors in the world, alongside aviation and nuclear energy. Labor relations within healthcare systems are especially noteworthy, as they contribute to an environment that is more susceptible to risks and failures. Furthermore, the likelihood of failures increases with the complexity of a system [1]. Interprofessional relationships between healthcare professionals are crucial in developing strategies to reduce disruptive behaviors and improve patient safety. Before this investigation, we conducted a systematic review to identify disruptive behaviors in nurse-physician

relationships and their impact on patient care [2]. However, we found limited international studies and none conducted within Spain's healthcare domain. This indicates a significant gap in the literature on disruptive behaviors in nurse-physician dynamics. Therefore, further research is necessary to understand healthcare personnel's perceptions of the factors contributing to disruptive behavior and areas that require improvement to prevent such behavior.

There is no consensus on the definition of disruptive behavior and safety climate. Nevertheless, this study aims to contribute to resolving this issue or advancing current knowledge. Concerning disruptive behaviors, we define them as actions that impede interpersonal communication,

strain work relationships, and hinder the sharing of crucial information among professionals, thereby directly impacting the quality of the care process [3, 4]. According to the patient safety culture [5], disruptive behaviors can lead to errors in the care process. Our study defines safety climate as how organizational factors influence the safety culture perceived by professionals and institutions [6, 7]. Specifically, patient safety culture is a strategic focal point to encourage healthcare professionals to adopt attitudes and behaviors that encourage patient safety [8]. Moreover, it fosters a nonpunitive environment in which individuals at all levels of an institution or organization (including caregivers, managers, and administrators) pledge to improve patient safety by promoting error reporting as a source of learning rather than blame [9, 10]. Cooper et al. stress the significance of fostering an organizational culture that esteems professionals, caregivers, managers, and administrators who adeptly navigate ethical conflicts impacting the quality of the care process. This culture encompasses effective communication (encompassing behavior management, staff safety status, and attitudes) and procedures (encompassing participation in decision-making, adherence to protocols, and task allocation) [11]. The perception of an unfavorable environment can lead to behaviors associated with horizontal violence, which negatively impacts patient safety [5]. On the other hand, creating a safe environment that promotes an improved safety climate can positively influence professionals' perceptions of workplace safety, leading to more favorable attitudes and behaviors toward patient safety. Research indicates a notable reduction (76%) in adverse event rates associated with such improvements [9, 12].

Many factors that cause disruptive behaviors are closely related to patient safety culture, particularly communication and teamwork. These factors significantly influence compliance with safe work practices [13] and healthcare professionals' perception of a safe environment [14]. Disruptive behaviors may be linked to low job satisfaction due to poor work relationships and co-worker communication [15]. Organizational risk factors at work [16], which include various aspects such as strategies, behavior, and attitudes adopted by healthcare centers to improve the safety environment, can influence professionals' perceptions. The attitudes and approaches of institutional managers and professional burnout can significantly affect emergency nurses' satisfaction and quality of work life.

For a long time, healthcare professionals and institutions did not openly acknowledge disruptive behaviors or measure their impact. In 2001 and 2002, the American Association of Critical Care Nurses (AACN) recognized the need to address the working relationships between nurses and management physicians. They emphasized the importance of establishing a reporting system for disruptive behaviors in healthcare facilities. They stated that such behaviors could not be ignored because they disrupt the workplace and can lead to unpleasant incidents and possible workplace accidents [17, 18]. In 2005, disruptive behaviors were observed to affect patient care and attention [19, 20]. In 2004, the Institute for Safe Medication Practices highlighted potential

risks to patient safety due to the approach to medications. They stated that the disruptive behavior of some physicians inhibits nurses from asking questions or providing information about the use of drugs. This behavior is labeled "dangerous silence" and can be interpreted as abusive behavior by some physicians that prevents nurses from answering questions or seeking clarification [21]. In 2008, Rosenstein et al. [22] found that healthcare professionals identified disruptive behaviors as a cause of adverse events that disrupt the chain of patient safety. In 2012, the same author emphasized the connection between disruptive behavior and patient safety. The study revealed that nearly 33% of physicians and nurses believed that these behaviors could lead to adverse events, and, more alarmingly, 12.3% of them were associated with an increased risk of patient mortality [23].

Disruptive behaviors generate vertical workplace violence and are considered a public health problem with global repercussions, affecting the entire healthcare system in its multiple spheres and levels [24]. As part of its healthcare quality accreditation process for healthcare institutions, the Joint Commission has made it mandatory for institutions to implement policies that address disruptive behavior. These policies should be based on human capital prepared to handle the complexity of the healthcare environment. The aim is to prevent and control factors associated with disruptive behavior while ensuring patients' safety and protecting healthcare professionals' occupational health (physical, mental, and emotional) [25]. This study aims to analyze healthcare professionals' perceptions of disruptive behavior and factors associated with patient safety climate in the nurse-physician relationship at the hospital level.

2. Materials and Methods

2.1. Study Design. A multicenter cross-sectional study was conducted to assess the perceptions of healthcare professionals at the hospital level about disruptive behaviors and factors associated with the patient's safety environment. The research was conducted at the hospital level within the network of public hospitals in the Murcia region. This region encompasses nine referral hospitals, each corresponding to one of the nine Health Area Managements of the Murcian Health Service. Specifically, this study was conducted in five of the nine referral hospitals.

2.2. Participants. The sample consisted of nurses (direct care), administrative nurses (indirect care/management), physicians (direct care/management), and administrative physicians (indirect care/management) assigned to different clinical and surgical services.

The study included all physicians and nurses working in public hospitals in the Murcia region, Spain, who met the following criteria: (a) had a contractual relationship (permanent/interim) with any of the hospital services, (b) had worked for more than a year in the service/unit and job position, (c) were Spanish or naturalized citizens and belonged to different work shifts, and (d) agreed to

participate in the study. We excluded professionals with temporary contracts or on standby (holidays or temporary leave) because these contracts were subject to short periods in the same department/unit/plant and high staff turnover, which could bias the perception of the safety climate and work relationships.

The professionals were identified based on the hospital's human resources lists.

2.3. Procedure. During the study period, from January to July 20, 2022, a researcher was responsible for providing and collecting evaluation instruments. The researcher personally delivered each instrument to participants and explained the importance of their participation in the study. No personal data were included in the instrument to ensure anonymity and confidentiality. Participants were instructed to complete the scales and group them by units/services. The completed scales were collected and sealed in an envelope. In April 2022, a reminder intervention was conducted to increase the response rate.

2.4. Measurements. The instrument used was the Spanish version of the original "Survey on the nurse-physician relationship: The impact of disruptive behavior on patient care" [25]. This scale was cross-culturally adapted and validated for use at the hospital care level in Spain. [26]. In this study, the scale obtained a Relevance Index (RI) of 0.89 and a Pertinence Index (PI) of 0.94. The RI and PI values were both below 8, which was considered acceptable for each item and for the scale as a whole. Most of the items in the scale showed a moderate to almost perfect level of concordance between responses (16 items). The Intraclass Correlation Coefficient (ICC) values for these items were equal to or greater than 0.75, indicating excellent reproducibility. Additionally, all items in the scale showed a general agreement index of 100%. The scale is made up of 21 items. In the first part of the scale, the socio-occupational variables are presented: age, sex, service, and position (nurse and clinician or administrative physician). The latter was identified as nurse and clinician, which defines professionals who spend 50% or more of their working day in clinical tasks/direct patient care, and nurse and administrative/managerial physician, which represents professionals who spend 50% or more of their working day in administrative tasks/indirect management. Items 1 to 9 assess the perception of the environment, specifically the safety climate, in the relationship between nurses and physicians, addressing the presence and frequency of disruptive behaviors in different services and specialties. However, items 10 to 17 focuses on assessing the perception of the impact of disruptive behaviors on patient safety, considering various psychosocial aspects, adverse events, and dimensions such as communication and information. Items 18 to 21 focus on assessing the reporting system for disruptive behaviors and barriers that may hinder its effectiveness (Supplementary Table S1). This scale provides a comprehensive measure of the perception of disruptive behaviors in the relationship between physicians and nurses and their impact on patient care.

2.5. Data Analysis. Each item on the scale was used as a variable to assess healthcare professionals' experiences of disruptive behavior in the physician-nurse relationship and its impact on patient care. No missing data was present as we discarded incomplete questionnaires. This upheld data integrity for accurate analysis.

Proportions or means (standard deviation (SD)) were used to describe the participants' characteristics and the questionnaire's items. Univariate and multivariate linear regression models were used to analyze the perception of the environment of the physician-nurse relationship and the severity of problems caused by disruptive behavior. The chi-square test was used to compare the proportion of physicians and nurses who had witnessed disruptive behavior. We also used this test to examine the frequency with which physicians and nurses believe disruptive behavior negatively affects the team and patients. *P* values <0.05 were considered significant. All analyses were performed using SPSS software version 22.0 (IBM, Armonk, NY, USA).

2.6. Ethical Considerations. Approval was obtained from the Ethics Committee of the Catholic University of Murcia (Code No. CE041825) and from all participating hospitals to conduct the study. Furthermore, confidentiality and data protection are guaranteed by Organic Law 3/2018, of 5 December, on the Protection of Personal Data and the Guarantee of Digital Rights [27].

The Materials and Methods section should contain sufficient detail to repeat all procedures. It may be divided into headings if several methods are described.

3. Results

Of the 500 nursing and medical professionals from public hospitals in the Murcia region invited to participate in this study, 370 responded to the scale/instrument (74%). Most of the sample consisted of men (53%) between 20 and 29 years old (42.7%). 41.1% belonged to the emergency department. Regarding position/category, there were few differences in the frequency of participation, except for the low participation of administrative physicians (indirect assistance/management) (18.4%) in the other categories (Table 1).

The average perception of the nurse-physician relationship environment among the 370 participants was 8.05 (SD = 1.59).

Table 2 details the mean values for each variable studied and the results of the univariate and multivariate linear regression analyzes that identify the sociodemographic and occupational determinants of the environment of the nurse-physician relationship. The findings revealed a statistically significant association between the variable age range 30–49 years, both in the univariate (0.487, *p* < 0.05) and multivariate (0.566, *p* < 0.05) models, compared to the reference group (20–29 years). A significant association was also found with the administrative group (indirect care/management) of physicians in the univariate (0.975, *p* < 0.05) and multivariate (0.625, *p* < 0.05) models compared to physicians (direct care). The intensive care unit

TABLE 1: Characteristics of the participants.

Variables	<i>n</i> (%)
<i>Sex</i>	
Woman	174 (47.0)
Men	196 (53.0)
<i>Age</i>	
20–29 years	158 (42.7)
30–49 years	121 (32.7)
>50 years	91 (24.6)
<i>Job position</i>	
Physician (clinical)	97 (26.2)
Physician (administrative)	68 (18.4)
Nurse (clinical)	101 (27.3)
Nurse (administrative)	104 (28.1)
<i>Unit</i>	
Emergency department	152 (41.1)
Intensive care unit (ICU)	137 (37.0)
Surgery	81 (21.9)

(ICU) (univariate -0.453 , $p < 0.05$; multivariate -0.505 , $p < 0.05$) and surgery (univariate -1.090 , $p < 0.001$; multivariate -1.078 , $p < 0.001$) also showed significant associations compared to the emergency department. Nagelkerke's square R indicated that the independent variables used in the multivariate linear regression model explained 11.5% of the variance of the dependent variable.

According to the perception of nurses and physicians ($n = 370$), a higher prevalence of disruptive behaviors was observed in specific areas, the most affected being the intensive care unit (ICU) with 81.6% ($n = 302$), followed by the emergency department with 67.8% ($n = 251$) and general medicine with 58.6% ($n = 217$). Regarding the frequency of such behaviors according to specialty, respondents reported a higher incidence in general surgery with 83.0% ($n = 307$), followed by obstetric/gynecology with 45.9% ($n = 170$), and cardiology with 40.8% ($n = 151$). On the other hand, the specialty with the lowest frequency of disruptive behavior was anesthesia, with 13.2% ($n = 49$) of affirmative responses.

Table 3 shows that physicians (clinical) (87.6%) and administration/management nurses (81.2%) were the most frequent witnesses of disruptive behavior by a physician. When asked, have you ever witnessed disruptive behavior by a nurse at your hospital? A positive response from clinicians was observed (96.6%). Furthermore, compared to nurses, a significant difference was found and nurse clinicians (76.9%, $p < 0.001$) reporting more disruptive behavior from another nurse clinician.

In the multivariate model, the perception of the severity of disruptive behavior problems was primarily influenced by age and the care service. Table 4 shows that physicians and nurses in the age range between 30 and 49 years and those older than 50 years have a more marked perception compared to other age groups. Furthermore, the surgical service showed a significant influence on this perception in both professional categories, with coefficients of 0.911 ($p < 0.001$) for physicians and 0.674 ($p < 0.001$) for nurses.

When analyzing the impact of the results of disruptive behaviors in the nurse-physician relationship on the patient

safety climate, the following factors were identified: stress and frustration (219, 59.2%), loss of concentration (207, 55.9%), reduced teamwork (161, 43.5%), reduced information sharing (214, 57.8%), reduced communication (269, 80.0%), and problems in the nurse-physician relationship (256, 69.2%). When analyzing the differences between physicians and nurses in these factors, it was found that loss of concentration, reduction in transmitted information, and problems in the nurse-physician relationship have a significant implication ($p < 0.001$) on the patient's safety environment according to nurses compared to physicians (see Table 5).

When asked about the relationship of disruptive behavior with aspects or indicators related to patient safety, the following percentages were identified: adverse events (25.4%), patient safety errors (13.0%), quality of care (20.8%), patient mortality (14.9%), nurse satisfaction (33.2%), physician satisfaction (43.2%), and patient satisfaction (39.2%). When analyzing the differences between physicians and nurses, it was found that physicians have a significantly more negative perception of quality of care ($p < 0.001$) and patient mortality ($p < 0.001$) than nurses.

Most professionals, 83.8% ($n = 310$), indicated that they were aware of a possible adverse event that could have occurred as a result of disruptive behavior. Furthermore, 29.0% ($n = 90$) stated that such events could be severe. Some 47.3% ($n = 175$) indicated that they were aware of the following adverse events that had occurred as a result of disruptive behavior: lack of information (8.6%), delays in care (28.0%), misunderstandings between staff (26.9%), and misinformation provided to relatives (36.6%).

Four questions were asked about the system to prevent and report patient safety incidents. When asked whether incidents could have been prevented, 94.9% ($n = 166$) answered yes. Regarding the conduct procedure, 99.7% ($n = 369$) indicated that a code of conduct or protocol is in place to address disruptive behavior in their hospital. Of these, 27.8% ($n = 103$) stated that a protocol was followed, while 71.9% ($n = 266$) mentioned a code of conduct. Virtually all professionals (99.7%) stated that a nonpunitive recording system was in place for those who witnessed or experienced disruptive behavior. In terms of barriers or obstacles to reporting disruptive behavior, practitioners noted fear of reprisals (82.4%), lack of confidentiality (19.7%), feeling that nothing would change (31.6%), and no response or outcome (10.0%).

4. Discussion

Overall, professionals assessed the nurse-physician relationship environment positively, though disruptive behaviors were noted in clinical practice, potentially impacting safety climate and clinical outcomes. Age and service type emerged as key variables affecting perceptions of disruptive behavior impact. Stress, communication barriers, and nurse-physician relationship issues were linked to disruptive behavior. Nurses reported more negatively affected concentration and information transmission. Due to disruptive behavior, physicians perceived lower care quality, safety, and

TABLE 2: Univariate and multivariate analysis of the perception of the environment of the nurse-physician relationship.

Variables	Mean (SD)	Univariate B coefficient (SE)	Multivariate B coefficient (SE)
<i>Sex</i>			
Woman	7.91 (1.56)	Reference	
Men	8.18 (1.61)	0.265 (0.166)	
<i>Age</i>			
20–29 years	7.84 (2.03)	Reference	
30–49 years	8.32 (1.29)	0.487 (0.191)*	0.566 (0.171)*
>50 years	8.08 (1.00)	0.241 (0.208)	
<i>Job position</i>			
Physician (clinical)	7.70 (1.67)	Reference	
Physician (administrative)	8.68 (1.55)	0.975 (0.248)*	0.625 (0.206)*
Nurse (clinical)	8.03 (1.49)	0.329 (0.223)	
Nurse (administrative)	8.00 (1.53)	0.299 (0.221)	
<i>Unit</i>			
Emergency department	8.46 (1.71)	Reference	
Intensive care unit (ICU)	8.01 (1.08)	–0.453 (0.182)*	–0.505 (0.183)*
Surgery	7.37 (1.82)	–1.090 (0.212)**	–1.078 (0.212)**

Nagelkerke *R* Square: 0.115. * $p < 0.05$; ** $p < 0.001$.

TABLE 3: Frequency of witnessing disruptive behavior.

Job position	Have you ever witnessed disruptive behavior from a physician in your hospital?	
	Yes	No
Physician (clinical)	85 (87.6)	12 (12.4)
Physician (administrative)	53 (77.9)	15 (22.1)
<i>p</i> value	0.098	
Nurse (administrative)	82 (81.2)	19 (18.8)
Nurse (clinical)	77 (74.0)	27 (26.0)
<i>p</i> value	0.220	
Job position	Have you ever witnessed disruptive behavior from a nurse in your hospital?	
	Yes	No
Physician (clinical)	94 (96.9)	3 (3.1)
Physician (administrative)	63 (92.6)	5 (7.4)
<i>p</i> value	0.210	
Nurse (administrative)	55 (54.5)	46 (45.5)
Nurse (clinical)	80 (76.9)	24 (23.1)
<i>p</i> value	<0.001	

higher mortality rates. Such behaviors also diminished satisfaction among patients, physicians, and nurses. Professionals recognized patient safety incidents associated with disruptive behaviors but did not understand safety incident taxonomy. A cultural perception hindered trust in reporting systems for learning and improvement, indicating a need for cultural change as a priority in improvement strategies.

Although disruptive behaviors are not uncommon [28, 29] and should be of concern for healthcare institutions to improve patient safety and foster a working environment conducive to positive outcomes [7, 30], few studies have been published on this problem in the healthcare setting. This is the first study in Spain, to our knowledge, that explicitly addresses disruptive behaviors in the healthcare setting. The first published studies correspond to Rosenstein

et al., the authors of the instrument used in our research. In 2002, they analyzed 1,200 questionnaires on the United States West Coast [25]; in 2005, there were 244 participants [31].

In recent years, studies like ours have obtained a lower response rate than ours (74%). For example, a study in Singapore had a response rate of almost 40% (39.9%), and most of the respondents were physicians (64.2%) [32]. This contrasts with our results. In the context of Iranian healthcare care, we found two relevant studies. One of them, carried out in health centers affiliated with the University of Isfahan, involved 248 professionals, most of them nurses [33]. The other study was carried out in four emergency departments, with 45 physicians and 110 nurses responding [34]. Considering cultural and social differences, the professionals participating in our study may have a greater postpandemic awareness, leading them to participate in studies to improve the psychosocial aspects associated with the care process.

According to our 10-point maximum rating scale, our professionals reveal a moderate-high degree (with an average of 8.05 points). Being between 30 and 49 years old and working in the surgery and ICU departments are the sociodemographic and occupational factors most influencing this perception. Regarding age, these results were expected, as it is likely that, with increasing age, professionals acquire more experience and a more critical view of their working environment, identifying aspects that may go unnoticed by their younger colleagues.

Regarding the type of service, several studies have found that emergency and operating room areas are the most significant in the manifestation of disruptive behavior [22, 23, 25, 33, 35]. These two environments are high-stress environments characterized by high communication flow and remarkable concentration. Surprisingly, our findings, in agreement with those of Rosenstein and O'Daniel [35], indicate that the emergency department is not significant in

TABLE 4: Perception of the severity of problems caused by disruptive behavior.

Variables	Physicians	Model 1	Model 2	Nurses	Model 3	Model 4
<i>Sex</i>						
M	2.83 (1.77)	Reference		2.37 (1.27)	Reference	
W	2.47 (1.44)	-0.353 (0.168)*	-0.377 (0.156)*	2.13 (1.10)	-0.246 (0.124)*	
<i>Age (years)</i>						
20–29	3.02 (1.90)	Reference		2.28 (1.24)	Reference	
30–49	1.97 (1.26)	-1.052 (0.187)**	-1.073 (0.166)**	1.93 (1.17)	-0.359 (0.141)*	-0.343 (0.138)*
>50	2.88 (1.14)	-0.140 (0.204)		2.59 (1.02)	0.309 (0.154)*	0.433 (0.152)*
<i>Job position</i>						
Phys. (C)	3.22 (1.99)	Reference		2.37 (1.35)	Reference	
Phys. (A)	2.75 (1.77)	-0.466 (0.249)		2.32 (1.20)	-0.048 (0.187)	
Nurse (A)	2.35 (1.15)	-0.870 (0.224)**		2.38 (1.07)	0.005 (0.168)	
Nurse (C)	2.32 (1.33)	-0.899 (0.223)**		1.94 (1.09)	-0.429 (0.167)*	
<i>Servicio</i>						
ED	2.28 (0.97)	Reference		2.13 (1.01)	Reference	
ICU	2.63 (1.64)	0.345 (0.185)		2.11 (1.21)	-0.016 (0.138)	
Surgery	3.33 (2.22)	1.050 (0.216)**	0.911 (0.188)**	2.69 (1.36)	0.566 (0.161)**	0.674 (0.146)**

Data are presented as the coefficient b (standard error). Model 1: Univariate model of disruptive behavior of physicians; Model 2: Multivariate model of disruptive behavior of physicians; Model 3: Univariate model of disruptive behavior of nurses; Model 4: Multivariate model of disruptive behavior of nurses. Nagelkerke *R* square: Model 2 = 0.157; Model 4 = 0.098. **p* < 0.05; ***p* < 0.001.

TABLE 5: How often do you think disruptive behavior results in the following? Difference between physicians and nurses.

Impacts	Physicians	Nurses	<i>p</i> value
<i>Stress and frustration</i>			
No	77 (52.3)	72 (47.7)	0.013
Yes	86 (39.3)	133 (60.7)	
<i>Loss of concentration</i>			
No	89 (54.6)	74 (45.4)	<0.001
Yes	76 (36.7)	131 (63.3)	
<i>Reduced teamwork</i>			
No	82 (39.2)	127 (60.8)	0.018
Yes	83 (51.6)	78 (48.4)	
<i>Reduced information transmission</i>			
No	107 (69.0)	48 (31)	<0.001
Yes	58 (27.1)	156 (72.9)	
<i>Reduced communication</i>			
No	36 (48.6)	38 (51.4)	0.433
Yes	129 (43.6)	167 (56.4)	
<i>Nurse-physician relationship problems</i>			
No	66 (57.9)	48 (42.1)	<0.001
Yes	99 (38.7)	157 (61.3)	

overall perception; on the contrary, the intensive care unit (ICU) and the operating theatre are. The Nagelkerke *R* square coefficient of determination value of 11.5% highlights the importance of interpreting this result with caution and assessing the linear relationship with other socio-occupational variables in future research.

In terms of the type of department and specialty, there are different perceptions. When asked about the prevalence of disruptive behaviors by department type, the emergency department and the ICU are the most relevant in our study. However, in terms of specialty, they are more frequent in general surgery, which coincides with the study by Saghaei et al. [33]. This reflects that these services have a context characterized by high demand and a high level of technology

where life and death are separated by an instant or an error in care. It is understood that these characteristics can contribute to the perception of disruptive behaviors in these environments.

Our results reveal a significant discrepancy with the existing literature on the observation of disruptive behaviors. Previous research has indicated that clinicians and nurse clinicians frequently witness such behaviors in their work environments, primarily by clinicians. However, in our study, clinicians reported seeing disruptive behavior from other physicians and nurses with greater frequency than that reported by nurses, in line with the results of Lim et al. This finding is remarkable and contradicts the prevailing conception, suggesting that direct care nurses, who work in

contexts characterized by hierarchies, manifestations of authority, and negotiation of responsibilities, especially in emergency and operating rooms, are more susceptible to abusive behaviors from physicians.

Both older physicians and nurses show a higher perception of the severity associated with disruptive behaviors, with significant negative implications in the context of the surgical service. This phenomenon suggests that these factors are relevant in the professional assessment of the seriousness of disruptive behaviors. This finding indicates that more experienced practitioners may be more willing to express their views on disruptive behaviors' possible complications and effects.

According to the perspective of professionals and according to the existing literature, the main factors linked to disruptive behaviors that impact the safety climate include stress and frustration [32–39], poor communication [32], and problems in the nurse-physician relationship [33]. However, nurses report a more negative perception of lost concentration and reduced information transmission than their medical colleagues. This insight underscores the importance of communication and information for safer care [40, 41]. Professionals recognize the relevance of all aspects of communication for continuity of care and to promote a positive working relationship between nurses and physicians [42]. Both healthcare bodies and international organizations recognize that deficiencies in patient information transmission can cause substantial safety problems [42, 43]. Effective communication is a global goal to improve patient safety [44], as reflected in Strategic Objective 6: Information, research, and risk management of the World Patient Safety Action Plan 2021–2030 [45]. According to Astier-Peña et al. [46], this goal aims to ensure a better flow of information and knowledge to promote risk management and ensure more respectful care at all levels of care.

Regarding the undesirable clinical outcomes associated with disruptive behaviors, professionals point out that these directly impact the satisfaction levels of patients and professionals themselves, according to previous research [32–34, 47]. There is also evidence of their relationship with adverse events in clinical practice. Given the consequences and impact of disruptive behaviors, these results were predictable. The degree of satisfaction is not always determined solely by the structure or level of knowledge; it can be related to a culture of attitudes and behaviors that have a negative impact on working relationships [48, 49], compromising the safety climate, weakening teamwork, and affecting job satisfaction. Furthermore, our findings highlight that physicians are the ones who most strongly perceive the relationship between disruptive behaviors and poor quality of care and patient mortality, in agreement with another research [32, 34]. However, these cause-effect results must be assessed with caution, as other factors that have not been studied or may be intrinsically or hidden in negative behaviors and attitudes can be involved, which can be detrimental to the care process.

Although unwanted events due to disruptive behavior were not unexpected, as identified in other studies [20, 22, 25, 32, 34, 41, 45], we were surprised by the high

percentage observed in the investigated context. Professionals reported adverse events such as “misinformation to relatives,” “delay in care,” and “misunderstandings between staff.” We recognize that disruptive behaviors affect the safety climate and can have severe consequences on the job, compromising the nurse-physician relationship and creating obstacles to improving the quality of care. However, when examined from the perspective of the taxonomy of safety incidents proposed by the Heinrich Pyramid, we observe that, rather than events, they constitute patient safety incidents with the potential to cause patient harm [50]. These incidents are classified as near misses, indicating the possibility of having caused harm to the patient [50], and physicians indicated that these risk circumstances for patient safety could have been avoided. Furthermore, they noted clear guidelines in their centers on addressing disruptive behaviors, through protocols or codes of conduct. We believe that this aspect is relevant and should be integrated into the healthcare management strategies of each center and institution.

In examining the question related to the reporting system for disruptive behaviors witnessed or experienced, almost all practitioners indicated that it was a nonpunitive system. However, a significant proportion of them expressed that fear of reprisals was a major concern, acting as a substantial barrier to reporting such behavior. Furthermore, they reported a perceived lack of feedback or positive response as a consequence of the report. They noted that there was no change in practice, findings that are consistent with previous research [31, 33, 34, 47]. Against this backdrop, several questions arise. Is there truly a nonpunitive system, or does fear persist among professionals to speak openly and honestly about the reporting system? Do professionals understand the inherent meaning and function of a reporting system? Have health institutions succeeded in effectively implementing a reporting system? These questions raise fundamental questions about the culture of patient safety. Despite more than two decades since the publication of the report *To Err Is Human* [51], it remains imperative to address these issues to drive continuous improvement in quality and safety in healthcare. The foundation of all healthcare systems is an awakening towards improving patient safety, evidenced by joint efforts and focused attention on this crucial aspect. Despite two decades since the National Quality Forum's recommendation to implement safety culture as the first of its “30 safe practices,” there is still a way to go towards fully realizing this goal [52]. From our perspective, the “tip of the iceberg” represents only a visible fraction of a broader set of factors influencing or determining safe practice. We recognize that visible and invisible aspects intrinsically relate to patient safety culture. This culture, characterized by its nonpunitive nature and its focus on learning from mistakes, is a fundamental element in promoting safety and improving the quality of care [8].

This study is not without limitations. First, the sample used. Our study focused on five hospitals of the 9 Health Departments of Murcia Healthcare, Spain. This selection can restrict the interpretation of the results, as it is described as a global perception of professionals only in hospitals in

a specific region of Spain. Although it was not our main objective, it is important to note that including other professional categories could enrich the understanding of the general importance of disruptive behaviors. This aspect should be addressed in future studies. It is essential to remember that the subjects in our study represent only a sample of the total population, which also implies certain limitations regarding the generalizability of the findings.

The second aspect refers to the “Nurse Physician Relationship Survey: Impact of Disruptive Behavior on Patient Care.” Although the results of the previous study of adaptation and validation [24] in Spanish were satisfactory, certain important aspects must be considered. Not many questionnaires or scales have been found that specifically address disruptive behavior in the hospital setting. Although this scale covers all the issues relevant to our research objectives, few studies are available to compare the results obtained. In the Spanish context, none have been identified to date. More research is needed to assess the perception of disruptive behaviors in the hospital setting and their impact on patient safety using this national and international instrument to establish meaningful comparisons between different countries.

Finally, another study limitation is the lack of consideration for potential confounding variables. While efforts were made to control for known factors, variables beyond the scope of this research could influence outcomes. Future studies should address these variables to provide a more comprehensive understanding of the phenomena under investigation.

5. Conclusions

Professionals have assessed that the nurse-physician relationship environment is relatively good overall. However, disruptive behaviors have been observed in clinical practice, which can have a negative impact on the safety climate and clinical outcomes.

Age and type of service were the most relevant socio-occupational variables for the perception of the impact of disruptive behavior in the nurse-physician relationship. The factors most associated with disruptive behavior and influencing the safety environment included stress and frustration, reduced communication, and problems in the nurse-physician relationship. Nurses expressed significantly more negative perceptions of losing concentration and reducing information transmission.

Regarding the impact of disruptive behaviors on the nurse-physician relationship and clinical outcomes, physicians have a more unfavorable perception of quality of care, patient safety, and even mortality rate. In addition, disruptive behaviors negatively influence patient, physician, and nurse satisfaction.

We have observed that professionals do not yet understand the taxonomy of patient safety incidents, but they have a relatively high perception of incidents associated with disruptive behaviors. In addition, a cultural perception persists that generates fear and “low credibility” with respect to the reporting system as a tool for learning and

improvement. Changing culture is not an easy challenge, but it significantly impacts other countries and remains a priority in improvement strategies.

Data Availability

The data used to support the study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that there are no conflicts of interest with respect to the publication of this paper.

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Supplementary Materials

Table S1: original and cross-culturally adapted and validated in a Spanish context of the instrument “Survey on the nurse-physician relationship: The impact of disruptive behavior on patient care.” (*Supplementary Materials*)

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Research Article

The Effect of Ethical Leadership on Nurse Bullying, Burnout, and Turnover Intentions

Jason R. Lambert ¹, Lee W. Brown ¹, Thanayi A. Lambert ² and Caleigh Torres Nava ¹

¹College of Business, Texas Woman's University, Denton 76204, Texas, USA

²College of Nursing and Health Innovation, University of Texas at Arlington, Arlington 76019, Texas, USA

Correspondence should be addressed to Jason R. Lambert; jlambertphd@gmail.com

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The bullying of nurses by patients, doctors, and employees is common in the healthcare industry. Nurses who are bullied are more likely to experience burnout, and nurses who experience burnout are more likely to intend to quit. However, few studies investigate how leadership can mitigate workplace incivility and nurse bullying as a way to improve nurse retention. A cross-sectional study was conducted using a sample of 216 nurses recruited from various regions across the United States from different specialties. A moderated mediation model using path analysis was used to examine the relationships between bullying, burnout, and ethical leadership in predicting intentions to stay. Bullying significantly and positively related to burnout ($\beta = 0.22, p = 0.02$), and burnout significantly and negatively related to intent to stay ($\beta = -0.18, p = 0.01$). Perceived ethical leadership predicted intentions to stay ($\beta = 0.62, p = 0.00$), and ethical leadership moderated the effect of bullying on burnout ($\beta = 0.20, p = 0.03$). The results of our study also suggest that nurses are less likely to quit when ethical leadership is present, and ethical leadership weakens the effect of bullying on burnout.

Keywords: burnout; ethical leadership; turnover intentions; United States; workplace bullying

1. Introduction

Nurses are a key part of the healthcare system; they have the majority of direct interactions with patients, and it is estimated that by the next decade over 13 million nurses will be needed worldwide [1]. In the United States, there will be a national shortage of 63,720 full-time registered nurses for nursing roles by the year 2030 [2]. Additionally, the health systems of all 63 countries of the World Health Organization European Region have been adversely affected [3], and a shortage of more than 100,000 nurses is expected in Australia by the year 2025 [4]. This shortage is, in part, due to a variety of factors including a decline in nursing faculty, an aging population, an aging nursing workforce, burnout, staffing ratios, and verbal abuse in healthcare settings [4]. Many new nurses graduating and beginning their careers are not staying in the profession as a whole for long [5]; in

addition, fewer nurses are becoming certified [6–8]. Additional factors contributing to this shortage include workplace environment, team dynamics, leadership style, organizational commitment, and turnover [7]. As this historical shortage persists in the United States [9, 10], patient care suffers, and the remaining nurses tend to be overworked, which leads to more negative experiences for those remaining.

In recent years, events such as the introduction of the Affordable Health Care Act in the U.S. have resulted in a substantial increase in potential patients testing the capacity of healthcare providers [11]. Coupled with global health pandemics such as SARS, Ebola, and Covid-19 over the past few decades, first responders in healthcare have encountered additional strain that leads to burnout [12] and lower job engagement worldwide [13, 14]. For example, during the time of the COVID-19 pandemic, nurses in

Australia and New Zealand experienced more stress and greater workloads [15, 16]. More than half of the 351 nurses in a study conducted in Oman during the pandemic reported high levels of job burnout [13]. This resulting burnout among nurses is high [17, 18], and it is an important variable that affects employee turnover intentions [19]. Therefore, it is critically important to assess the level of burnout among nurses and identify factors that can reduce it.

Turnover can be costly for organizations monetarily [20], but turnover among nurses has even greater implications for healthcare organizations because it negatively impacts patient outcomes [21] and healthcare resources [22]. Nursing shortages lead to negative outcomes including an increase in mortality, staff violence, accidents, and injuries [8], rates of nosocomial infections, patient mortality, patient falls, pressure ulcers, prolonged average hospital stay lengths, and additional healthcare costs [23], further validating the need for solutions to ameliorate it.

Prior research has shown that some main psychological predictors of turnover include job satisfaction [24, 25], organizational commitment, and intent to stay [24, 26], value attainment, and mood [25]. Being bullied at work [27], burnout [19, 28], and leadership style [29] have also been shown to influence employees' turnover intentions. In the context of nursing, inadequate staffing is another important predictor of turnover because it leads to greater physical exhaustion by nurses managing heavy workloads [28].

Bullying is one way in which experienced nurses control new nurses to meet objectives, but verbal abuse can be traumatic for new nurses [30] and lead to outcomes that are psychologically, physically, and emotionally harmful [31]. In prior research, bullying is "considered as the most chronic issue in the health-care sector" [32]: 2, and being placed in stressful and unethical situations such as this can lead to job burnout [33]. Moreover, nurses who experience bullying at work may leave the nursing profession altogether [34–36]. Although bullying and burnout can negatively affect outcomes for nurses and their patients, scant research addresses strategies to reduce bullying incidents, especially related to nursing [37].

Some research results suggest that leadership styles of nursing managers can impact nurse behavior [29]. Unfavorable leadership styles, such as toxic leadership, are positively related to turnover intentions [29] while favorable leadership styles, such as transformational leadership, are negatively related to turnover intentions [38]. Despite the call from scholars to redirect attention to ethical leadership to improve nursing and patient outcomes [39], empirical investigations on how it can impact a culture of workplace incivility and burnout are limited. Because ethical leadership can model ethical performance [37], we propose that ethical leadership will ameliorate workplace incivility, and possess a buffering effect on burnout that stems from bullying behavior.

In this study, we examined perceived ethical leadership among nurses working for various types of healthcare provider institutions, and the consequences of bullying and burnout on intentions to stay. Our aim is to understand some understudied causes of turnover intentions in nursing.

Our study makes a significant contribution to the literature in the following ways. First, given the turnover crisis in the nursing profession [4, 8], we fill a void in the turnover intentions literature by investigating how an ethical leadership style can mitigate the effect of bullying on burnout. Furthermore, because ethical leadership is understudied in the nursing literature [32, 37], and bullying is prevalent among new nurses [40], we examine its effect on intentions to stay among nurses who experience burnout as a result of experiencing or observing bullying in the workplace. In line with prior research, we contend that bullying and burnout have negative effects on intentions to stay, and further the literature by proposing that perceptions of ethical leadership influence this relationship.

As shown in Figure 1, we hypothesize that bullying is directly related to job burnout of nurses. Further, we propose that job burnout is negatively related to intentions to stay. Also depicted by our model, we contend that leadership perceived to be ethical by nurses ameliorates the effect that bullying has on job burnout. Lastly, we propose the interaction effect between perceived ethical leadership and bullying on job burnout is indirectly related to intentions to stay resulting in a moderated mediation model.

1.1. Predictors of Turnover Intentions. Turnover intention refers to when an employee's motive is to leave a specific organization [41] and is a predictor of the actual act of turnover [42]. Job turnover among nurses has been an ongoing concern for many years [43] with the national average total hospital turnover rate being 19.5% as of 2022 [44]. In general, four types of variables have been studied extensively as predictors of turnover which include job training, job involvement, positive affectivity, and negative affectivity [45]. Positive and negative affectivity refer to dispositional states of pleasurable or unpleasurable engagement, respectively [46]. Justice, stress, and social support are variables associated with positive and negative affectivity used to research determinants of turnover [45], which include, but are not limited to, dimensions of supervisory support, role overload, role conflict, and perceptions of fairness [45]. Specific to the field of nursing, job turnover is exacerbated when nurses' have negative experiences in their work environment [47]. For example, other factors contributing to turnover include pandemic-related pressures [48], inadequate nurse staffing [49, 50], dealing with toxic leadership [29], and workplace violence [51]. In line with research on perceptions of fairness, bullying in the workplace is associated with high turnover intentions [52–54]. Viewed as a form of stress, burnout is also linked to intentions to quit and actual turnover [33]. As of recent, nurses specifically are leaving the nursing field due to emotional exhaustion brought on by high job demands, low job control, and role overload due to caring for COVID-19 patients [55], that also contributes to lower overall psychological well-being among nurses [48]. Besides dispositional effects on turnover intentions, perceptions regarding the nursing profession and the negative public image of their organization also affects nurses' job satisfaction which in

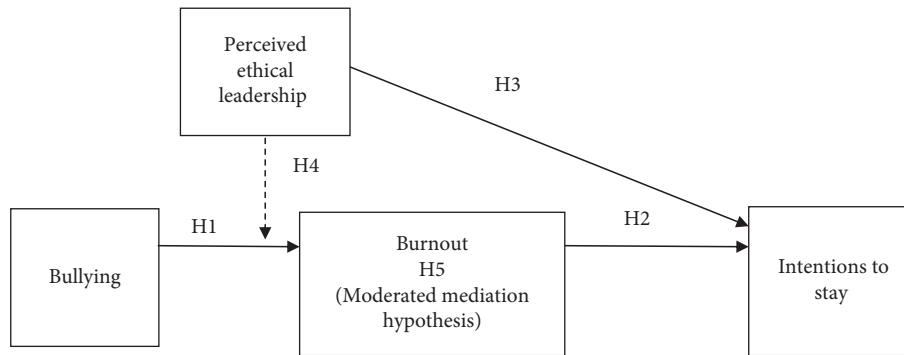


FIGURE 1: Conceptual model.

turn influences their decision to quit their job or the profession entirely [51, 56].

1.2. Nursing Context. For our study, we focus on bullying and how it leads to both burnout and nurse intentions to stay because healthcare organizations are especially susceptible to bullying behaviors [30, 57]. There is evidence to suggest this may be because nurses are taught to bully others as an organizational cultural norm [58], and that healthcare systems traditionally operate using paternalistic styles of leadership that can lead to the oppression of nurses [58], exacerbated by authoritarian management practices [59]. Bullying is the act of aggressive behavior toward an individual repeatedly over time [60] which may also violate employees' civil rights [61]. Due to both the nature of their work environments and hospital group dynamics, nurses work under unique conditions that can be tied to turnover, including the experience of both physical and psychological effects. Physical conditions experienced by nurses from doctors, patients, and co-workers include "invasion of personal space, shoving and blocking the way, threat of violence, physical abuse, or actual abuse" [57]: 140. Patients in facilities where nurses are bullied can also receive poor nursing care or experience adverse events [62, 63]. We suggest that the nurse manager can play a key role in mitigating these bullying behaviors as a way to increase nurse retention and improve patient outcomes. Specifically, we study the effect that the ethical leadership of the nurse manager has on these scenarios.

1.3. Bullying and Job Burnout. Job burnout occurs when employees experience chronic stress resulting from their job [64] and is caused by various stressors which may include a number of physical or psychological issues nurses experience in their workplaces [65]. A key dimension of burnout is exhaustion [33], which is defined in the nursing literature as a common feeling of physical and emotional overload experienced by nurses stemming from interactions with co-workers and patients [66]. A work environment where bullying occurs is a stressful environment where employees feel intimidated, abused, or insulted, resulting in a stressful work experience [32]. Workplace bullying among nurses can lead to a number of psychological and mental health

outcomes and work behaviors such as quiet quitting [67], depression, suicidal ideation, post-traumatic stress disorder, deterioration in the quality of their work life [68], job dissatisfaction [51], and burnout [69]. Physical health symptoms experienced by bullied nurses include headaches, eating disorders, onset of chronic diseases, and sleep disturbances [40].

Emotional exhaustion, a dimension of burnout [33], can be exacerbated by bullying, which could have a greater effect on intent to leave than any other factor [35]. Bullying can manifest itself in unfair treatment or any sort of verbal or physical harassment and may greatly influence whether or not nurses stay with an organization [61]. Examples of bullying include, but are not limited to, verbal attacks, intimidations, and withholding support [70] and its effect on employees shares similar characteristics to symptoms of burnout including anxiety and depression symptoms [33, 71, 72]. Further, prior research has shown that nurses experience burnout in climates where workplace bullying occurs [73]. In line with prior research, we contend that bullying is another prevalent factor that explains intentions to quit as it influences feelings of burnout.

Hypothesis 1. Bullying is positively related to burnout.

1.4. The Effect of Burnout on Intentions to Stay. Some of the global nursing shortage can be attributed to burnout, as increasingly more countries report how it has directly impacted turnover across their health systems [50]. Since nurses are likely to experience job burnout [74], the relationship between burnout and turnover must be further explored, especially since nurses have ongoing interaction with patients and their visitors, and frequent encounters with work stressors [75]. Burnout is considered a stress phenomenon, linked to lower job performance and poor health outcomes [33, 76], physical and mental health outcomes including psychological and physiological fatigue [75], impaired short-term memory and cognitive decline [77], alcohol and drug use [76], and disintegration of family and social relationships [74, 78, 79]. Under stressful circumstances associated with burnout, employees are less committed to the organization [80], become exhausted, and struggle to continue working. Some recent examples of stressful circumstances that relate to burnout and turnover

among nurses include, but are not limited to, inadequate staffing [50], anxiety, and fear stemming from caring for patients during the COVID-19 pandemic [81]. Consequently, nurses experiencing burnout seek other jobs [82] and are more inclined to quit [75]. Not only is nurse burnout related to greater turnover [51, 83], burned-out nurses may no longer communicate effectively with others, engage in behaviors of workplace incivility [83], and experience physical and mental health challenges. Burned-out nurses will also express indifference toward patients [84] which can jeopardize their safety [21].

Hypothesis 2. Burnout is negatively related to intentions to stay.

1.5. The Effect of Ethical Leadership on Employees and Organizations. The type of leadership employees receive can greatly influence performance, especially in an environment like that of nursing. Ethical leadership is an observable expression from leaders of support for behavior deemed appropriate for followers that may be enacted through relationship building [85], communication, decision-making, and reinforcement [86]. Various studies have shown that ethical leadership creates an ethical environment conducive for reducing moral distress, thereby improving job satisfaction and absenteeism [87]. However, among the few studies on ethical leadership in the nursing literature that do exist, the number of quantitative studies is lacking [88].

Leaders in an organization set the tone for employees in terms of establishing a support system, the work environment, and acceptable behaviors. In fact, one of the most powerful methods to promote ethics in healthcare and the nursing practice is to role model ethical performance on the managerial level [37]. Leaders, through displaying and modeling ethical leadership, foment an ethical environment for nurses. Working in an ethical environment is especially important in a healthcare environment; especially at the nurse level, given that they interact the most frequently with patients.

1.6. Ethical Leadership and Turnover Intentions. In environments where nurses are “faced with obstacles that force them to act against their ethical beliefs, they feel discomfort, dissatisfaction, and frustration” [89]: 5, which can increase intentions to quit. An ethical environment allows nurses to feel supported and operate in an environment that is conducive to a higher quality of patient care. Moreover, ethical leadership influences the behavior of employees through its influence on the work climate [90]. However, many nurses report that they feel unsupported by their leaders [37] and some nurse leaders admit that ethical practice should be emphasized more as a part of organizational support [39]. However, the literature regarding the role of ethical leadership in nursing has recently been sparse [37]. For these reasons, we expect ethical leadership to be immensely important in the nursing field, which can prove beneficial for healthcare systems via increased job satisfaction for nurses and better patient outcomes [39]. Medical practices may

receive outsized gains for attracting and developing ethical leaders throughout their organization due to the difficult work climate that nurses face on a day-to-day basis [91]. Furthermore, results from prior research suggest that a climate perceived as ethical helps prevent burnout [92] and strengthens organizational commitment [92–94], and job satisfaction [95–97], both predictors of turnover intentions [56]. For this reason, we expect to find that strong ethical leadership has a direct relationship with intention to stay.

Hypothesis 3. Perceived ethical leadership is positively related to intentions to stay.

1.7. The Interaction Between Perceived Ethical Leadership and Bullying. While we suggest that bullying [27] and burnout [98] will increase employees’ intentions to leave an organization, we propose that the employment and development of ethical leaders in the organization can mitigate those intentions. Ethical leadership in place decreases employee anxiety about their job and increases employee behavior aligned with ethical principles [99]. Ethical leaders are both moral persons and moral managers [100]. Not only do they need to be moral individuals, but also they must apply that morality in the workplace. Brown and colleagues [86] define ethical leadership as “the demonstration of normatively appropriate behavior through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement, and decision-making (p. 120).” Prior research has utilized social learning theory to explain how ethical leadership can mitigate negative workplace environments [101, 102]. This is welcome news for healthcare providers and nurses in particular because work environments in healthcare organizations have been shown to create a climate that leads to burnout [103].

Ethical leaders set a standard for what moral behavior is like in the workplace [104]. Employees with ethical leaders learn what is and what is not appropriate behavior in the organization through their leaders. In addition to the likelihood that bullying would decrease under ethical leaders due to an increased ethical climate [105], employees reporting to ethical leaders will be much less likely to assume bullying behavior is normal and appropriate workplace behavior. Evidence suggests that employees with ethical leaders will develop the ability and willingness to confront and address the conflict behavior [106] rather than assuming that exiting the organization is their only way out. For example, Islam and colleagues [32] found that the presence of ethical leadership positively influenced employee voice behavior and negatively affected bullying. In addition to the ethical role modeling and increased psychological safety that employees feel when working for ethical leaders, these ethical leaders have also been found to increase employees ability to deal with relationship conflict situations in the workplace by increasing employees’ ability to create resolution [101]. In addition to social learning, the way that leaders design the work environment has been found to be a key mechanism for ethical leaders to decrease workplace

bullying [107]. Prior research indicates that ethical leaders influence both the work climate that an employee works in and influences the behaviors and abilities of employees directly. For these reasons, we expect ethical leadership to moderate the effect that bullying has on employee burnout.

Hypothesis 4. Perceived ethical leadership moderates the effect of bullying on burnout such that nurses will experience less burnout from bullying when ethical leadership is high compared to when it is low.

Thus far we have proposed that bullying is positively related to job burnout (i.e., Hypothesis 1 above), and that this relationship is moderated by perceived ethical leadership (i.e., Hypothesis 4 above). We also proposed that perceived ethical leadership is positively related to intentions to stay (i.e., Hypothesis 3 above). As prior research suggests that job burnout predicts turnover intentions, we contend that perceived ethical leadership signals to nurses messages of support regarding bullying prevention which, in turn, improve their feelings of job burnout, and ultimately intentions to stay. Thus not only do we propose that job burnout is related to intentions to stay (i.e., Hypothesis 2 above), we also propose that a conditional indirect effect exists for bullying and perceived ethical leadership on intentions to stay through job burnout. Based on prior research regarding the mediating role of burnout [79], this type of model is a moderated-mediation model [108, 109] resulting in our final hypothesis (full model shown in Figure 1).

Hypothesis 5. Bullying is related to intentions to stay via conditional indirect effects, such that its relationship with intentions to stay is moderated by perceived ethical leadership and mediated by job burnout.

2. Materials and Methods

2.1. Participants. A total of 216 nurses from various regions across the United States were recruited from different specialties to participate in the current research study in exchange for modest compensation. One hundred were identified through an email listserv managed by the Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN) and followed by nurses in obstetrics and women's health as their primary field. The remaining 116 were recruited using an online surveying agency (Turk-Prime's Prime Panels platform: <https://www.turkprime.com/LaunchedSurvey/PrimePanels>) that commissions large-scale stratified samples. By recruiting participants from a wide array of online sources, this service allows researchers to set a priori demographic quotas for sampling. The panel was set to ensure the recruitment of participants from the nursing field.

2.2. Measures. All of the scales of measurement used for the current study were adapted from those published in peer-reviewed journals and have a reliability Cronbach's alpha coefficient greater than 0.80.

2.2.1. Intentions to Stay. The dependent variable intentions to stay were measured using a four-item five-point Likert scale [110] used to measure intent to stay. For the current study $\alpha = 0.89$. Sample items include "I would like to leave my present employer" and, "I plan to stay with my present employer as long as possible."

2.2.2. Bullying. The workplace incivility/bullying culture scale [111] was adapted to measure the independent variable bullying. It includes 12 items and uses a five-point Likert scale. The scale yielded a coefficient $\alpha = 0.96$ for the current study. The survey begins with the following incomplete question to be completed by the 12 listed items to total 12 questions: "During the past year were you ever in a situation in which any of your supervisors or coworkers. . ." Sample items used to complete the question asked of participants include "Gave you hostile looks, stares, or sneers" and, "Made jokes at your expense."

2.2.3. Burnout. Malach-Pines' [112] short version of burnout measure was used to measure the mediating variable job burnout of participants in the current study. It includes 10 items using a seven-point Likert scale and yielded a coefficient $\alpha = 0.92$. Participants are asked an introductory question "When you think about your work overall, how often do you feel the following?" Sample items that follow the introductory question for participants to answer include "Hopeless", and "Difficulties sleeping."

2.2.4. Perceived Ethical Leadership. We measured perceptions of ethical leadership using the 10 item five-point Ethical Leadership Scale that Brown and colleagues [86] developed. For the current study $\alpha = 0.96$. Sample items include, "Conducts his/her personal life in an ethical manner," and "Sets an example of how to do things the right way in terms of ethics."

2.2.5. Controls. Age, race and organizational tenure were originally entered as control variables, and because they significantly did not have an effect on the primary variables of interest we removed them from the main statistical analysis.

2.3. Procedures. Online surveys were used to collect the data for this study. Participants replied to a link sent to their email address after having signed up to be a part of the research study either through their listserv announcement or as part of the Prime Panels platform. Upon clicking on the link, participants were redirected to an introductory web page where they provided consent before completing a battery of questions including surveys that measured the primary variables of interest in the current study dispersed among other surveys that measured various work attitudes, perceptions, beliefs, and basic demographic information.

2.4. Statistical Analysis. A moderated mediation model using path analysis in Mplus v.8 was conducted to examine proposed relationships [113] as seen in Figure 2. A moderated mediation path model is a statistical technique used to

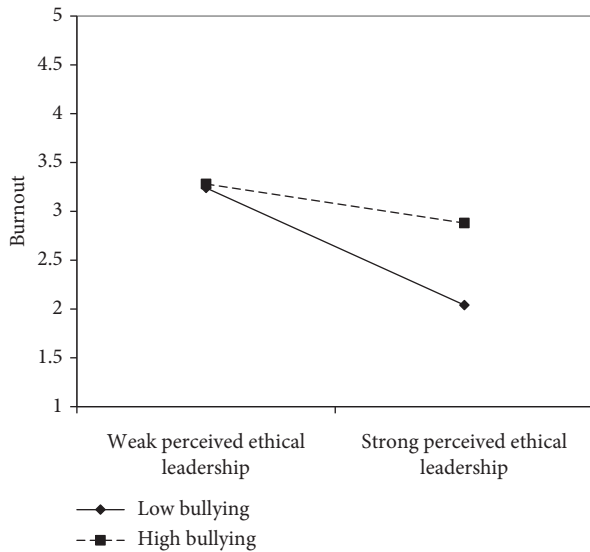


FIGURE 2: Graphed interaction effect between bullying and perceived ethical leadership on burnout.

examine how the relationship between two variables (independent and dependent variable) is influenced by a third variable (moderator) through a mediating variable [114, 115]. In this model, the mediator (burnout) lies between the independent and dependent variables and explains part of the effect of the independent variable on the dependent variable. The moderating variable (ethical leadership) influences the strength or direction of the relationship between the independent variable and the mediator, ultimately affecting the indirect effect on the dependent variable. The current model examined the interaction between bullying, burnout, and ethical leadership in predicting intentions to stay. The primary purpose of the model was to examine how job burnout mediated the relationship between bullying and intentions to stay. In addition, the interaction effect between bullying and perceived ethical leadership on job burnout was tested to examine the mediation effect further.

3. Results and Discussion

3.1. Results. Participants with missing data related to the variables being investigated were removed resulting in 184 valid responses ($N = 184$); a response rate of 85.2%. Respondents were 92% female with an average age of 40.2 years ($SD = 11.95$), and most were White (84%), followed by Black (7.4%), Hispanic/Latinx (6.8%), and American Indian (1.9%).

Table 1 shows the means, standard deviations and bivariate correlations for all study variables. It should be noted that the path model was just-identified, thus, model fit indices were not useful (i.e., $RMSEA = 0.00$, CFI and TLI = 1.00). Our first and second hypotheses were supported as expected indicating that bullying significantly and positively relates to burnout ($\beta = 0.22$, $p = 0.02$), and burnout significantly and negatively relates to intent to stay (i.e., intentions to quit) ($\beta = -0.18$, $p = 0.01$), respectively.

TABLE 1: Descriptive statistics and bivariate correlations.

Variable	Mean	SD	1	2	3
1 Bullying	1.58	0.79			
2 Burnout	3.10	1.17	0.30**		
3 Ethical leadership	0.13	1.10	-0.39**	-0.42**	
4 Intentions to stay	3.60	1.10	-0.36**	-0.46**	-0.61**

Note: $N = 184$.

Abbreviation: SD, standard deviation.

** $p < 0.01$.

Hypothesis 3 which proposed that perceived ethical leadership predicts intentions to stay was also supported with significance ($\beta = 0.62$, $p = 0.00$), and our fourth hypothesis proposing that ethical leadership moderates the effect of bullying on burnout was supported ($\beta = 0.20$, $p = 0.03$). The graph of the interaction in Figure 2 indicates the direction hypothesized with perceived ethical leadership mollifying the effect of bullying on burnout. Our fifth and final hypothesis proposed a moderated mediation model. Although there were significant paths from bullying to burnout and from burnout to intent to stay, and the interaction term was significant, the indirect effect of bullying on intentions to stay was not significant; hence Hypothesis 5 was not supported ($\beta = -0.04$, $p = 0.08$). Table 2 presents the results and coefficients for the observed variables.

3.2. Discussion. There is an ongoing shortage of skilled nurses across many high income countries. The key components of nursing work of providing care are challenging and emotionally trying, which have an impact on the shortage and the ability of the industry to attract and retain nurses [116], and the resulting quality of patient care [28]. Prior research has established that bullying relates to burnout [23, 69, 116–118], yet there is limited research that examines solutions to mitigate this relationship, and how nurse leaders, specifically, can address this cultural phenomenon. There is limited research that investigates the effect of ethical leadership on nursing outcomes [37], and scant research in the nursing literature addresses how various styles of leadership can mitigate the effect of bullying on burnout and turnover intentions, specifically. The results of the current study contribute to the literature and to solutions for mitigating burnout and turnover among nurses in a number of ways.

The results of the current study align with prior research suggesting that bullying relates to burnout, and that burnout relates to turnover intentions [23, 118]. The results also suggest that bullying has a main effect on turnover intentions. However, we found no indirect effect for bullying on turnover intentions through burnout in the present study, compared to prior studies with nurses working in Taiwan [23] or Korea [118]. This could be due to cultural differences and how workplace culture is perceived differently by nurses in the United States compared to nurses from other countries. For example, based on Hofstede's dimension of national cultures [119], the United States ranks lower than Taiwan and Korea on the dimensions of power distance and higher on the dimension of individualism. Power distance is defined as the

TABLE 2: Summary of path analysis predicting intentions to stay.

Path	R ²	β	SE
Burnout on	0.23*		
Perceived ethical leadership		0.39***	0.09
Bullying		0.22*	0.09
Perceived ethical leadership X			
Bullying		0.20*	0.09
Intentions to stay on	0.52***		
Perceived ethical leadership		0.62***	0.06
Burnout		-0.18*	0.07

Note: N = 184.

Abbreviation: SE, standard error.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

degree to which employees prefer a consultative or participative style of leadership (i.e., low ranking) versus an autocratic style of leadership (i.e., high ranking) [119]. Individualism refers to the degree in which a person views their connection to their society on a spectrum of either having loose ties to others and looking after one's self (i.e., high ranking), or valuing strong bonds with their community and having a great sense of loyalty to their society (i.e., low ranking) [119]. Employees in the U.S. who prefer a consultative style of leadership (i.e., low power distance) may be less apprehensive about expressing their opinions, attitudes, and beliefs with leadership compared to employees in other countries where a more autocratic style of leadership is preferred (i.e., high power distance). Also, employees in the U.S. who are more likely to hold individualistic ideals (i.e., high individualism) may be more likely to challenge the "status quo" compared to employees from countries where collectivism ideals (i.e., low individualism) are the norm. We posit that this perspective may weaken or eliminate the indirect effect that bullying has on turnover intentions. This is because their perceived ability to express concern about bullying may serve as a coping mechanism for reducing burnout, thereby weakening the relationship. More research about the relationship between bullying, burnout, and turnover intentions among nurses in the U.S., and its comparison across multiple countries may offer a more comprehensive understanding of this phenomenon.

Suggestions for mitigating the effects of bullying and burnout on turnover have been proposed in prior research [23, 118], but there is limited empirical evidence that these solutions work. Although prior research has investigated the relationship between leadership, bullying, burnout, and turnover intentions, not all leadership styles have been empirically examined as a means to mitigate the negative effects of this relationship. Laschinger and colleagues [120] conducted a study with results to suggest that authentic leadership negatively affects workplace bullying. Another study, qualitative in nature, suggested that transformational leadership attributes are important for establishing a positive hospital work environment [121]. We responded to the call for a greater examination of ethical leadership as an effective tool to manage nursing outcomes in healthcare [37, 118], and specifically the call to propose interventions to mitigate the effect of bullying on burnout [69]. Not only did the current study results suggest that ethical leadership has

a positive main effect on intentions to stay, the results also show that ethical leadership ameliorates the effect of bullying on burnout. Providing ethical leadership training and employing nurses who demonstrate ethical leadership may be a useful strategy for mitigating the effect of bullying on burnout, two important predictors of turnover.

4. Limitations and Future Research

It is important to note a few limitations of this study. The current study used self-report measures where social desirability may have affected the results of the data in addition to mono-method bias as a result of common method variance [122]. Cross-sectional designs such as the kind used for our study also poses limitations on causal inferences regarding the relationships between the observed variables. Online data collection also can pose limitations for controlling environmental factors. However, prior research has established there is equivalence between the results of online survey methods and results produced using paper-and-pencil formats [123].

Although our study yielded significant findings, qualitative studies may offer additional explanations to why ethical leadership mitigates the effect of bullying on burnout and increases intentions to stay in the nursing field. The current study used the survey method to measure participants' perception about the ethical leadership of their nurse manager, which can limit the richness of the data collected. Research questions that address how followers identify ethical leadership in healthcare settings are warranted. For example, does it matter if perceived ethical leadership communication is verbal instead of written? Are there any effects for gender based on the identity of leaders or nurse managers? Building on prior research [124], should we investigate whether any effects exist for race based on the identity of leaders or nurse managers perceived as ethical? Future researchers should address these questions to explain the effect of different circumstances under which ethical leadership influences the behavior and attitudes of nurses.

5. Conclusions

The aim of the current study was to investigate the relationships between perceived bullying, burnout, perceived ethical leadership, and turnover intentions. In line with prior research, the results suggest that nurses who get bullied are more likely to experience burnout, and nurses who experience burnout are more likely to intend to quit. Furthering this line of research, the results of our study also suggest that ethical leadership weakens the effect of bullying on burnout, and nurses are less likely to quit when ethical leadership is present [125–130].

5.1. Implications for Nursing Management Research. Our path analysis findings align with and extend previous research on workplace mental health outcomes in nursing. The significant relationship we found between bullying and burnout ($\beta = 0.22$, $p = 0.02$) supports prior studies showing that workplace incivility and bullying contribute to emotional exhaustion and burnout among nurses [73, 116]. The moderating effect of

ethical leadership on this relationship ($\beta = 0.20$, $p = 0.03$) builds on work by Laschinger et al. [130] on authentic leadership, suggesting that multiple positive leadership styles may help buffer against the negative effects of bullying.

Furthermore, our results highlighting the importance of ethical leadership in predicting intentions to stay ($\beta = 0.62$, $p = 0.00$) complement research on the nursing work environment. Studies have shown that supportive practice environments and ethical climates are associated with lower turnover intentions among nurses [96, 131]. Our findings suggest that ethical leadership may be a key factor in creating such positive work environments.

5.2. Implications for Nursing Management Practice. Developing a better understanding of ethical leadership's role in nursing has major implications for strategies to increase retention. There are instances when organizations go through periods of rough transitions when trying to improve their climate or culture. As leaders remove bully employees from their organization, ensuring there is ethical leadership in place may mitigate the degree of burnout experienced by nurses who are bullied. The first implication of our study is for healthcare administrators to recognize the importance of training nurse managers about ethical leadership principles and strategies. The study results suggest that this will help improve nurses' intentions to stay, and thereby reduce turnover in the field of nursing. Second, nurse managers who are perceived as ethical leaders have the effect of weakening the impact of workplace incivility on burnout. This should translate into better work outcomes for nurses and, in turn, improve health outcomes for patients. In line with prior recommendations for improving the nursing work environment [132], our results suggest that healthcare organizations should prioritize developing ethical leadership skills among nurse managers. This aligns with calls for creating positive practice environments to enhance nurse retention [133].

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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Research Article

Effectiveness of a Haemorrhage-Control Task Simulator for Training Nursing Students: A Quasi-Experimental before-after Study

Daniel Bertini-Pérez ¹, Luis Martin-Ibañez ², Pablo Gómez Chica ¹,
Iria Dobarrio-Sanz ^{1,3}, Miguel Rodríguez-Arrastia ^{1,4,5}, Pablo Roman ^{1,4},
and Lola Rueda-Ruzafa ¹

¹Faculty of Health Sciences, Department of Nursing, Physiotherapy and Medicine, University of Almería, Almería 04120, Spain

²Field Artillery Group, Light Infantry Brigade “King Alfonso XIII” II of the Legion, Almería 04240, Spain

³Research Group CTS-451 Health Advances and Innovation, University of Almería, Almería 04120, Spain

⁴Health Sciences Advanced and Innovation Research Group (CTS-1114), Almería 04120, Spain

⁵Science Flows, Universitat de València, Valencia 46010, Spain

Correspondence should be addressed to Pablo Roman; pablo.roman@ual.es

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Aim. To assess the efficacy of a low-cost haemorrhage-control task simulator integrated in a high-fidelity simulation scenario to facilitate knowledge and practical skills acquisition, as well as self-efficacy in haemorrhage control among nursing students. **Design.** A quasi-experimental before-after design was conducted at the University of Almería. **Methods.** A one-group preintervention, immediate postintervention, and a third assessment at three months were performed, with the Stop the Bleed Education Assessment Tool used to evaluate knowledge of haemorrhage control, as well as a 5-point Likert scale used to evaluate perceived self-efficacy. The success of controlling exsanguinating bleeding was determined by quantifying the millilitres lost during the intervention and calculating the time required to control the haemorrhaging. The data were reported using the TREND guidelines. **Results.** One hundred and three final-year nursing students participated in this study. Significant improvements ($p < 0.001$) were observed in pre- and posttest total scores on knowledge of bleeding control, self-efficacy, as well as time is taken and volume loss to control the haemorrhage. Similar results were observed between preassessment and three months postassessment with significant improvements ($p < 0.001$) in all measures. **Conclusions.** The use of a haemorrhage-control task simulator within a high-fidelity simulation scenario resulted in noteworthy improvements in nursing students' practical skills, knowledge retention, and self-efficacy. After three months, performance decreased but remained greater than pretraining levels. Thus, broadening the use of this task-training simulator would be of great value to further develop a first responder training approach with healthcare professionals and other laypersons, allowing for greater knowledge distribution and reaching a larger audience. **Implications for Nursing Management.** The findings underscore the potential efficacy of this simulator as a valuable resource for nursing educators and supervisors to train nursing students and professionals in terms of practical skills, knowledge retention, and self-efficacy in haemorrhage control, fostering a train-the-trainer cascade approach to reach a wider audience and enhance bleeding control proficiency among professionals.

1. Introduction

Haemorrhagic shock is a severe form of hypovolemic shock that occurs when significant blood loss leads to insufficient oxygen delivery at the cellular level and, if ignored, may

culminate in death within minutes [1]. Indeed, only haemorrhage is the cause of death in 55.1% of patients aged 1 to 46 [2], thereby being the primary cause of intrahospital mortality within 48 hours after admission and the second highest cause of prehospital death in both military and

civilian trauma patients, accounting for 40–45% of all fatalities [3–6]. In this context, managing patients with haemorrhagic shock remains difficult and complex, with a high mortality rate [7–9]; hence, early recognition and prompt action to halt bleeding are critical, as the condition is time-dependent [4, 10].

Moreover, 34.5% of traumatic accident patients die from preventable bleeding-related causes, either in the prehospital setting or within an hour of being admitted to the hospital [11, 12]. While strengthening hospital and prehospital care seems to be essential for reducing trauma-related mortality, further bleeding control training needs to be provided to ensure such successful interventions [13–15]. The World Health Organisation and numerous consensus groups recommend first responder training programmes, for instance, as the first step in formalising emergency medical services in areas where no prehospital services have yet been created [16–18]. In this vein, one of the most effective and well-established training programmes for adequate bleeding control worldwide is the Stop the Bleed (STB) campaign, a basic short educational programme for both laypeople and healthcare professionals, that aims to provide education on wound compression, wound packing, and the use of emergency tourniquets [19]. According to certain research, even a single 2-hour STB training course could significantly increase self-confidence and competence among healthcare students instructed in bleeding control measures [20, 21].

Aside from the STB programme, there are a number of additional training programmes available that have similar objectives, which include Haemorrhage Control Course [22], Tactical Combat Casualty Care, and Advanced Trauma Life Support [23]. These programmes all share an agreed-upon aim of providing individuals with the knowledge and skills to effectively manage haemorrhage, with tourniquets standing as the primary device used to control time in exsanguinating haemorrhage in extremities [24, 25]. Although different methods can be employed for this training, simulation-based education, ranging from low-fidelity simulation (LFS) to high-fidelity simulation (HFS), has been shown as one of the most successful teaching-learning approaches for these scenarios [26–28]. In this manner, high-fidelity simulation (HFS) stands as the most popular and effective approach for incorporating realism and authenticity into the educational experience for demanding scenarios [29]. Notably, nursing students demonstrate superior outcomes in both technical and nontechnical skills when employing HFS during their emergency environment training [30]. This may not only foster self-confidence but also help in lowering anxiety levels among students [29, 31]. However, recent evidence suggests that its use in haemorrhage control training programmes such as STB appears to be currently limited and costly due to the nature of the specialist simulators and personnel skillset required [32].

Notwithstanding self-efficacy in bleeding control is paramount in successfully performing the intervention, and specialised training for first responders and healthcare professionals has shown improvement in confidence across all domains, thereby increasing the ability to manage severe active bleeding and pack a bleeding wound, and there is still

scant evidence regarding the use of cost-effective HFS for haemorrhage education. For these reasons, the aim of this study was to assess the efficacy of a low-cost haemorrhage-control task simulator, recently patented by our research team (ES-1294309_U [33]) and integrated into an HFS scenario to facilitate knowledge and practical skills acquisition, as well as self-efficacy in haemorrhage control among nursing students.

2. Material and Methods

2.1. Design and Participants. A quasiexperimental one-group before-after design was conducted at the University of Almeria from February to July 2022, following the recommendations of the Transparent Reporting of Evaluations with Nonrandomized Designs statement (TREND) guidelines [34]. The study participants were selected through purposive sampling from final-year nursing students who met the following inclusion criteria: (1) were enrolled in clinical placement 6 and 7 modules, (2) attended the bleeding control training, and (3) signed the required informed consent forms prior to participation.

2.2. Clinical Simulation. An HFS scenario was designed using a low-cost haemorrhage-control task simulator developed by our research team (ES-1294309_U) and based on the INACSL of Best Practise Standards: SM Simulation Design framework [35]. This simulator comprises a first container, means for pressurizing the infusing liquid, a venepuncture member with a flexible conduit leading to a second collecting container, and pressure control means for the user to regulate the pressure on the venepuncture member. The simulator is calibrated to measure the millilitres exsanguinated and includes a timer to record the time taken to control the haemorrhage. Specifically, the device replicates a haemorrhage in a limb within a closed circuit, using a fluid simulating blood, pressurized at a constant pressure chosen by the user-trainer, optionally through a manual or automatic sphygmomanometer. Proper and effective tourniquet placement is essential for haemorrhage control, requiring the application of the appropriate pressure.

The clinical setting was intended to simulate an exsanguinating haemorrhage scenario in which the participant was only able to control the condition using a tourniquet, without prior training (PRE). The exsanguinating haemorrhage was caused by a 6-millimetre incised wound on the anterior surface of the simulator's forearm. Table 1 summarises the required elements used to lead the simulation-based experience.

Following the collection of PRE data, the clinical simulation started with an initial 90-minute briefing in which participants were presented with the purpose of the intervention and the scenario they were facing. The nursing students received training on the proper management of exsanguinating haemorrhages using a tourniquet. This training was provided by experienced military nurses in the field and was based on the first-care provider model. After

TABLE 1: Simulation training session of bleeding control.

PRE	Prebriefing	HFS components	Simulation	Debriefing	IPA	POST
Knowledge questionnaire (SBEAT)	Military nurses provide 90-minute specialised training based on the first-care provider model	Modality (exsanguinating haemorrhage simulator) Fidelity (realism through simulation equipment, setting, and scenario)	Haemorrhage-control task simulator integrated into a traumatic multiple-incident scenario (including an exsanguinating haemorrhage) Standardised emergency equipment (including tourniquet)	Plus-delta approach using double-barrelled questioning (problem-solving and critical thinking through informed learner self-assessment, and managing perception mismatches)	Knowledge questionnaire (SBEAT) Self-efficacy questionnaire (5-point Likert scale)	Knowledge questionnaire (SBEAT) Self-efficacy questionnaire (5-point Likert scale) Practical skills (time, exsanguinated volume)

3M: 3-month assessment; HFS: high-fidelity simulation; IPA: postassessment; PRE: preassessment; POST: postassessment; SBEAT: Bleed Education Assessment Tool.

the initial briefing, the simulation stage began, in which the students attempted to control the haemorrhage with the tourniquet (POST), applying the training received during the clinical simulation by the military. This was followed by a 30-minute debriefing stage in which critical thinking and perceptions were shared collectively. Additionally, three months (3M) later, a third assessment of each study parameter was performed to assess the short- to medium-term retention of knowledge and practical skills for bleeding control.

2.3. Instruments. The sociodemographic data were collected using an ad hoc questionnaire created expressly for this purpose. The gender, age, and total amount of previous training in bleeding control were all questions on this questionnaire. The level of knowledge in bleeding control, success in haemorrhage control with tourniquet application, and students' training self-efficacy were measured as outcome variables pre- and postintervention.

Pre- and postintervention student knowledge was assessed using a nonvalidated modified version of the Stop the Bleed Education Assessment Tool (SBEAT) [36], a standardised assessment instrument for evaluating cognitive components of first aid for potentially life-threatening haemorrhages. The tool used incorporates 34 items into 20 survey questions. The questionnaire score ranged from 0 to 100, with a higher score indicating more knowledge in the field. In a Rasch model, the mean infit statistics were 1.00 and the outfit was 0.99, showing a reasonable level of fit [37].

Conversely, student self-efficacy was measured using a 5-point Likert scale, which was applied to 23 questions in the developed questionnaire. The responses to each of the questions were totalled up at the end of the questionnaire and shifted so that the maximum score was 100 points; a higher score on the questionnaire was interpreted as a greater perceived self-efficacy by the student. Cronbach's alpha reliability levels for this instrument were 0.99 (PRE), 0.99 (POST), and 0.98 (3M).

Lastly, the success of controlling exsanguinating bleeding was determined by quantifying the millilitres lost during the intervention and calculating the time required to control the haemorrhaging. The blood lost quantification was carried out by instructors directly observing the simulator's collection bag, which was graduated in 20-millilitre increments. When the amount of exsanguinated blood did not exceed 800 millilitres and the time did not exceed 120 seconds, the intervention was deemed successful.

2.4. Data Analysis. All statistical analyses of the data were conducted using the IBM SPSS Statistics v.27.0 software. A significant value of $p < 0.05$ was considered for all statistical tests performed. First, a descriptive analysis was performed on sociodemographic variables. The frequencies and percentages of qualitative variables, and the mean and standard deviation of quantitative variables were calculated. The Kolmogorov–Smirnov test was used to determine the normal distribution of the data. The chi-square test was then

used to analyse the differences between qualitative variables. The Student's t -test or Mann–Whitney U test, ANOVA, or Kruskal–Wallis test were used for quantitative variables, depending on whether the variables matched normality conditions or not. Depending on the distribution, Pearson's or Spearman's correlation was used to relate quantitative variables.

2.5. Ethical Considerations. The study proposal was approved and authorised by the Ethics Committee of the Department of Nursing, Physiotherapy and Medicine at the University of Almeria (EFM 99/2021) and in accordance with all of the ethical aspects of the Declaration of Helsinki. All participants were informed and signed informed consent forms prior to participating in the study, as well as had the option to withdraw at any time. Added to that, participants were advised that their participation in the clinical simulation training would have no influence on their grades.

3. Results

One hundred and three final-year nursing students participated in the study, with women accounting for 78.64% ($n = 81$) and men for 21.36% ($n = 22$). In terms of age, the mean age was 23.34 years (5.81), with a range of 21 to 56 years. Baseline characteristics are summarised in Table 2.

Table 3 and Figure 1 provide a comparison of the variables knowledge, self-efficacy, time, and volume pre- and postintervention. These phases correspond to the initial evaluation (PRE), the immediate evaluation after the intervention (POST), and the three-month (3M) late evaluation.

In terms of participant knowledge, statistically significant differences were found between the PRE and POST findings ($Z = -5.84$; $p < 0.01$), as well as at 3M when compared to the PRE phase ($Z = -4.82$; $p < 0.01$). The mean questionnaire score in the PRE phase was 70.58 (10.24), increasing to 79.51 (8.53) in the POST phase and 76.70 (8.95) at 3M (Figure 1(a)).

PRE-intervention self-efficacy was significantly different from POST self-efficacy ($Z = -8.53$; $p < 0.01$) and self-efficacy findings at 3M ($Z = -8.23$; $p < 0.01$). The mean score in the PRE phase was 45.83 (21.69), 77.50 (15.24) in the POST phase, and 68.50 (15.19) at 3M (Figure 1(b)).

The time required for controlling bleeding differed statistically between the three phases: PRE-POST ($Z = -6.65$; $p < 0.01$), PRE-3M ($Z = -5$; $p < 0.01$), and POST-3M ($Z = -2.48$; $p < 0.05$). Prior to training, the mean time (s) to stop simulated haemorrhaging was 76.38 (41.28), which was reduced to an average of 41.69 (27.13) following the intervention and 47.13 (28.88) after three months (Figure 1(c)).

The difference in the amount of exsanguination (mL) in the simulator between the PRE and POST phases was statistically significant ($Z = -6.98$; $p < 0.01$) as was the difference between the PRE and 3M ($Z = -5.23$; $p < 0.01$) and between the POST and 3M ($Z = -2.84$; $p < 0.01$). The mean loss was 573.30 (246.01) in the PRE phase, 325.15 (179.83) in the POST phase, and 387.38 (199.10) at 3M (Figure 1(d)).

TABLE 2: Baseline demographic characteristics of participants.

Variable	N/M	%/SD
Gender		
Male	22	21.36
Female	81	78.64
Age (years)	23.34	5.83
Knowledge (0–100)	70.58	10.24
Self-efficacy (0–100)	45.83	21.69
Time (s)	76.38	41.28
Volume (mL)	573.30	246.10

TABLE 3: Comparison of the variables knowledge, self-efficacy, time, and volume pre- and postintervention.

Variable	PRE (M (SD))	POST (M (SD))	3M (M (SD))	PRE-POST sig. (Z)	PRE-3M sig. (Z)	POST-3M sig. (Z)
Knowledge (%)	70.58 (10.24)	79.51 (8.53)	76.70 (8.95)	0.000 (–5.84)	0.000 (–4.82)	0.011 (–2.55)
Self-efficacy (%)	45.83 (21.69)	77.37 (15.36)	68.50 (15.19)	0.000 (–8.53)	0.000 (–8.23)	0.000 (–5.92)
Time (s)	76.38 (41.28)	41.69 (27.13)	47.12 (28.88)	0.000 (–6.65)	0.000 (–5.00)	0.013 (–2.48)
Volume (mL)	573.30 (246.10)	325.15 (179.83)	387.38 (199.10)	0.000 (–6.98)	0.000 (–5.23)	0.005 (–2.84)

3M: 3-month assessment; PRE: preassessment; POST: postassessment.

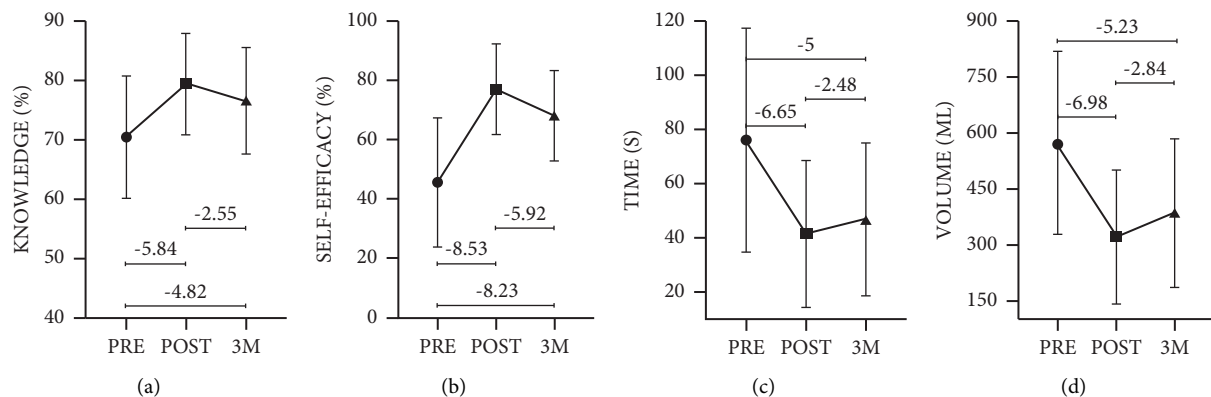


FIGURE 1: Comparison of the variables knowledge, self-efficacy, time, and volume pre- and postintervention.

4. Discussion

The aim of our study was to assess the efficacy of a low-cost haemorrhage-control task simulator integrated into an HFS scenario to facilitate knowledge and practical skills acquisition, as well as self-efficacy in haemorrhage control among nursing students. While there have been a few studies in this field to date, the current study emphasises training utilising a low-cost simulator to improve clinical skills and knowledge retention in the nursing student training process, which is created from generally available materials, requiring a minimal economic investment.

According to the findings of our study, final-year nursing students had a very poor success rate in haemorrhage management. At baseline, only half of the study participants demonstrated effective control prior to the intervention using a tourniquet. Likewise, the time required and the number of millilitres of blood lost during the pre-intervention phase were inadequate. This supports previous

findings employing certified training manikins as simulators [38, 39]. They found that the success rate in haemorrhage control among healthcare students was less than 66% and less than 24%, respectively, and the mean time taken was more than 75 seconds, and the amount of blood lost was more than 500 mL. Following the educational intervention, however, significant improvements in the level of knowledge, self-efficacy, and bleeding control skills among nursing students were observed, suggesting that the intervention was effective in improving the students' abilities to manage haemorrhages using a tourniquet. The present findings seem to be consistent with other research. Goralnick et al. [40] found that laypersons can successfully apply tourniquets following a one-hour course. Their study utilised various training methods, including an audio kit with visual aids on the device (audio kit) and instructional flashcards. Similarly, Stadeli et al. [41] reported improvements in knowledge and self-efficacy after participants received theoretical exposure with English slides followed by practical interpretation

without an apparent simulator. Furthermore, Muret-Wagstaff et al. [42] observed that participants achieved a proficiency level in controlling bleeding after four sessions. Their training consisted of in-person instruction following the Peyton 4-stage model and simulation-based mastery learning with deliberate practice on certified simulators of amputated limbs [42]. While earlier research has noted the importance of educational interventions in the domain of self-efficacy in bleeding control training [43, 44], our findings have important implications for developing similar results in self-confidence and self-efficacy among nursing students utilising a low-cost simulator. In this vein and as mentioned in the literature, participants are able to attain nearly flawless competency scores and appropriately assist a bleeding victim by applying direct pressure [45], particularly when HFS or more realistic models are being used, with no major financial expenditure [46]. The study by Orlas et al. [45] was conducted through a master class followed by a practical component, employing Z-Medica's training kits, which include certified manikins. Additionally, the study by Villegas et al. [46] also employed manikins as simulators.

Regarding the limitations of the study, it should be noted that the intervention was a pre-post design with expected improvements after the training and a late assessment at three months. Nonetheless, this is the first study to incorporate a low-cost simulator with regular nursing faculty materials in an HFS scenario, which demonstrated reliability and validity in evaluating advancement in knowledge level, self-efficacy, and haemorrhage control. Although our results demonstrate reliability and validity, it is important to note that the study design has several limitations and is not adequate for establishing causality. Therefore, in future studies, it would be desirable to perform a randomised trial that measures the retention of this training for a longer period than three months and expand the sample to other populations such as medical students, other healthcare professionals, civilian populations, or laypeople. Finally, another limitation of this study to consider was the use of tourniquets solely as haemorrhage control methods; hence, it might be worthwhile paying attention to other approaches such as pressure, wound packing, and others.

5. Implications for Nursing Management

In general, it seems that educating and training healthcare professionals and students is effective in promoting self-efficacy, knowledge retention, and ensuring patient survival while controlling and managing haemorrhages [47–51]. However, both laypeople and healthcare professionals continue to lack the necessary knowledge and expertise to utilise tourniquets properly [52], and thus, our findings may help healthcare educators and supervisors to find a suitable approach to foster training among their professionals and students in effective bleeding control. As previously stated in the literature, it may be worth noting that this basic training could serve as the initial step in a train-the-trainer cascade, allowing for more knowledge distribution and reaching a broader audience [20, 53].

6. Conclusion

The effectiveness of a low-cost task simulator within an HFS scenario for haemorrhage control training in nursing students was evaluated in this study, which revealed a significant improvement in the practical skills and knowledge retention of the students who used the simulator. This was evidenced by a reduction in the time required to apply a tourniquet and the millilitres of blood lost in the simulator, whereas knowledge and perceived self-efficacy were increased. Although a decrease in the performance of the students was observed after three months, they still maintained higher results than those obtained before the training and close to those obtained immediately after the high-fidelity clinical simulator training. Overall, these findings indicate that using a low-cost task simulator within an HFS can be a valuable resource for training nursing students in haemorrhage control, with effects that are comparable to additional simulators and persist over time, though reinforcement of its application may be required in the future.

Data Availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Effectiveness of a Patient-Family Carer Partnership Intervention on Blood Pressure Control for People with Hypertension in Rural Communities: A Randomised Controlled Trial

Dejian Zeng ¹, Wai Tong Chien ², and Mingyan Yang ¹

¹*Southern University of Science and Technology Hospital, No. 6019 Liuxian Street, Xili Avenue, Nanshan District, Shenzhen, China*

²*The Nethersole School of Nursing, Faculty of Medicine, The Chinese University of Hong Kong, 7/F, Esther Lee Building, Shatin, Hong Kong, China*

Correspondence should be addressed to Dejian Zeng; djzeng@link.cuhk.edu.hk

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Objectives. To examine the effectiveness of a patient-family (carer) partnership intervention on the BP control, self-care and self-efficacy for hypertensive people, and dyadic-relationship quality, depressive and anxiety symptoms, and health-related quality of life for the family dyads (hypertensive people and family carers) in rural communities of mainland China. **Design.** A randomised controlled trial. **Methods.** A total of 110 family dyads were randomly recruited from village clinics and randomly allocated to the intervention group ($n = 55$) or control group ($n = 55$). Family dyads in the control group received usual care. In addition to the usual care, family dyads in the intervention group received the individual-based, five-session patient-family (carer) partnership intervention. The primary outcomes included SBP, DBP, and the proportion of people with normal controlled BP. EuroQol five-dimensional-five-level (EQ-5D-5L) was adopted to evaluate participants' health-related quality of life. Data were collected at the baseline (T0), one-month (T1), and three-month postintervention (T2). Generalised estimating equation model was adopted to test the study hypotheses on all study outcomes. **Results.** Compared with the control group, hypertensive people in the intervention group had a greater reduction in SBP by 10.10 mmHg and DBP by 4.66 mmHg and a larger proportion of people with normal BP at T2, as well as statistically significant improvements at T1 and T2 in dyadic relationship, self-care, antihypertensive drug-titration rate, anxiety symptoms, and health-related quality of life. The intervention also had statistically significant positive effects on family carer's dyadic relationship and health-related quality of life at T1 and T2. **Conclusion.** The patient-family (carer) partnership intervention has the potential to improve hypertensive people's BP control and family dyad's dyadic-relationship quality and mental health at short-to-medium term follow-ups. **Implications for the Profession and/or Patient Care.** This study provided evidence and direction to support healthcare providers in developing and implementing patient-family (carer) partnership intervention for hypertension care in rural areas. This trial is registered with ChiCTR1900027087.

1. Background

Cardio-cerebrovascular disease is the leading cause of death and disability-adjusted life-year worldwide [1]. Hypertension is a major risk factor for cardio-cerebrovascular disease, and it is a major challenge for chronic illness management, with high prevalence and poorly controlled blood pressure

(BP) [2]. Hypertension prevalence in rural and urban areas could be similar, but the control rates were statistically significant lower in rural areas in China and worldwide, that was, about 9.8% versus 14.5% worldwide [3] and 9.5% versus 14.0% in China [4].

The health disparities in rural areas can contribute to the lower treatment and control rates of hypertension [5]. In

rural areas, the health disparities are considerably related to the healthcare system, socioeconomic condition, geographical distance of seeking healthcare services, strength and competence of healthcare providers, and individual characteristics such as education level and physical activity pattern, as well as the differences in cultural practices and living habits [6]. One of the largest health disparities presented in China is the inequality of resources and accessibility to healthcare services between rural and urban areas [7]. The percentages of hypertensive people receiving treatment provided by physicians in the recent two weeks are 11.29% in urban areas and 6.77% in rural areas [8].

Hypertension management interventions for populations in rural areas should consider specific sets of important sociodemographic characteristics of hypertensive people, the healthcare service/system, and their living districts/areas as needed. Families serving as an important source of social support for people with hypertension in rural areas can facilitate their compliance with the recommended treatment regimen [9]. Notably, Chinese family culture and values place high emphasis on the responsibilities and obligations of family members in caring for sick family members, considering them to be moral obligations and norms of Chinese societies [10]. These cultural specificities can influence family members' and carers' responses to the needs of their patients, the self-efficacy of an ill relative, and the relationship of the family dyad in daily care [11, 12].

Establishing a positive family-dyad (patient and the family carer) partnership is essential in family-oriented care at home [13]. Family care intrinsically involves the patients and their family carers (i.e., the family dyad) in close interactions and relationships. Family-dyad partnership is the supportive and collaborative relationship in illness management. A review of systematic reviews demonstrated that involving family members in chronic illness care can benefit patients and families [14]. However, there were research results showed that family care can be stressful for the patients and family carers during the caregiving process because of criticisms [15], family conflicts [16, 17], and overcontrolling or protective behaviours [18, 19], which can negatively affect the relationship between family dyad, as well as their physical and psychological health. Most family carers especially those living in rural areas often have lower levels of education and health literacy and may not be equipped or prepared for engagement and facilitated hypertension management. Interventions directed at improving family carers' ability and confidence and family-dyad partnership in providing care for hypertensive people are needed [20, 21]. Therefore, this study aimed to test a family-dyad partnership programme on BP control for people with hypertension in rural communities of mainland China.

1.1. Intervention Development. The development of the patient-family (carer) partnership intervention (PFPI) for people with hypertension and their family carers living in the rural areas of mainland China was (1) based on the findings of a systematic review and (2) guided by a theoretical framework-shared care model (SCM).

We conducted a systematic review to evaluate the effects of different approaches to psychoeducational intervention for family dyads in hypertension care and to examine the optimal structure, format, and components of effective interventions [22]. Synthesised evidence of the 15 (RCTs and quasiexperimental) studies demonstrated a small to medium effect of family dyad-oriented psychoeducational intervention on BP control. Several main intervention components among the effective psychoeducational interventions were identified, including education for lifestyle modification and medication adherence, home BP monitoring, and group education for family carers. In addition, interventions using a mixed-teaching approach (a combination of didactic and participatory learning) can be more effective for these family dyads than other methods. Also, several research gaps have been identified. First, very few interventions were developed to improve patient-family (carer) communication and cooperation in daily hypertension care. In addition, only two of the 15 studies adopted a theoretical framework to guide the intervention. Second, none of the included studies reported the effects of psychoeducational interventions for family dyads/family carers focused on health outcomes of family carers. Third, RCTs with high-quality methodology on psychosocial intervention for hypertension care are lacking. Well-designed RCTs of family-oriented psychoeducational intervention with commonly accepted health outcomes for the Chinese hypertension population are recommended. Finally, only two studies on hypertension care were conducted in rural areas; thus, the effects of psychoeducational intervention for hypertensive patients residing in rural areas are uncertain and inconclusive. Considering the low percentage of well-controlled hypertension and health disparities (e.g., lack of healthcare providers) in rural communities such as remote districts or villages in mainland China, there is a strong need or demand for a well-prepared family carer to facilitate and support daily care, lifestyle change, and health management for their hypertensive relatives. Therefore, a family-dyad psychoeducational intervention with didactic and participatory learning strategies (e.g., family dyadic communication, decision-making, and action planning) for hypertension care in rural communities can be designed for further testing among the population of family dyads of people with hypertension.

SCM was adopted to guide the intervention used in this study. SCM provides a structure on how to involve a family carer in caring for a patient with chronic illness. Figure 1 presents the theoretical framework of the current study. In the SCM, shared care is defined as an interpersonal process used by patients and family carers (family dyad) in home care to exchange support and manage a chronic illness [23]. Shared care is a dyadic process in which each participant affects and is affected by the other(s) [24]. The SCM hypothesises and anticipates that shared care can improve the effects of providing and receiving a family member's (carer's) assistance on improving the quality of the dyad's relationship and therefore positively affects the self-care and promotes the physical and mental health of the family dyads [23, 25]. Shared care elements (communication, decision-

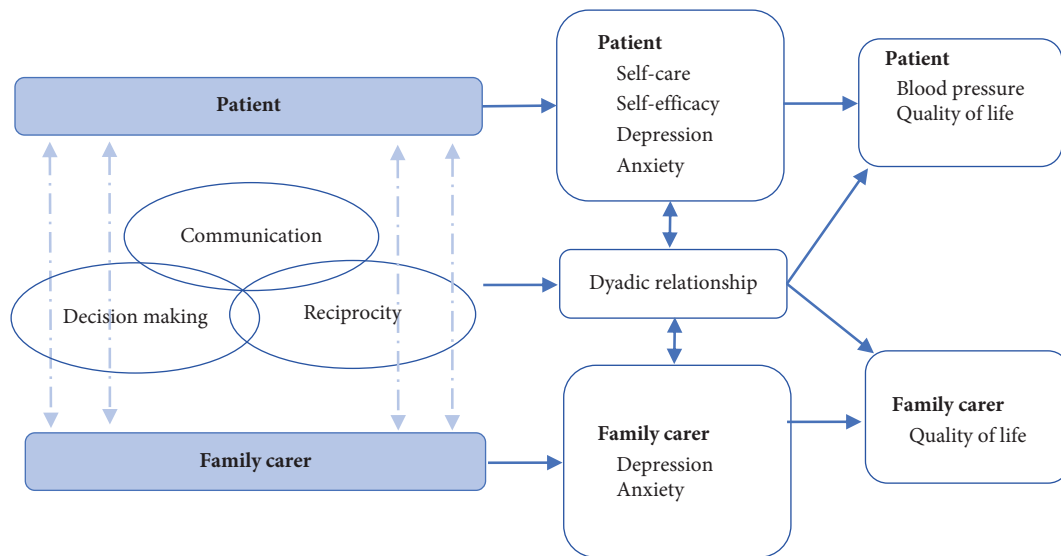


FIGURE 1: Theoretical framework of this study.

making, and reciprocity) have substantial positive associations with the self-care, depressive symptoms, dyadic-relationship quality, and health-related quality of life of patients with heart diseases and their family carers [26–28]. The elements or components of shared care also have inverse relationships with the strain and depressive symptoms of patients and their family carers (family dyads) [25]. Therefore, the SCM provided a practical and structured framework for developing the patient-family carer partnership intervention for the current study. The three main elements of shared care (communication, decision-making, and reciprocity) were used to guide intervention development.

2. Method

2.1. Study Design. This study adopted a single-blinded RCT with a parallel control (usual care) group and repeated measurements at one- and three-month postintervention. The study is reported in line with the Consolidated Standards of Reporting Trials 2010 Statement. We registered the study in the Chinese Clinical Trial Registry (registration number: ChiCTR1900027087) in October of 2019.

This study hypothesised that the participants in the intervention group would show statistically significant greater improvements at one-month and three-month postintervention, when compared with those in the control (usual care) group, on the followings:

- (1) The patients' SBP and DBP levels and proportion of patients with normal controlled BP (primary outcomes), self-care, self-efficacy, antihypertensive drug-treatment rate, antihypertensive drug-titration rate, dyadic-relationship quality, depressive and anxiety symptoms, and health-related quality of life
- (2) Family carers' dyadic-relationship quality, depressive and anxiety symptoms, and health-related quality of life

2.2. Participants and Setting. Hypertensive patients receiving home visits and care at two village clinics in Liuyang City, Hunan Province, China, were the potential eligible participants of this study. The eligibility of participants was identified according to the study criteria by the researcher in home visit. People with hypertension and their family carers (dyads) were randomly enrolled in this study.

These two adjacent rural villages are located in Liuyang City, which is the most populous county-level division in the easternmost part of Hunan Province of mainland China. Meanwhile, Hunan Province is located in the south-central part of China, with over 69 million population. Liuyang city (covering an area of around 5,000 km²) comprises 1.5 million residents. The villages under study are Gaoping and Longquan villages in Gaoping county, which are remote villages on the east side of Liuyang, being 20–30 km distance from Liuyang City. Each village has over 2,000 residents. Owing to the distance from the city, the village residents usually receive healthcare services provided by doctors at the village clinics. The public village clinics have only one medical staff (village doctor) in each clinic who provides primary health care to all residents there, such as home visits and medical consultations for people with hypertension, diabetes, and other chronic illnesses in the village(s).

Random sampling was used to recruit the eligible participants. The researcher reviewed the hypertensive people's medical records in the two village clinics under study and created a list of potential participants in alphabetical order of their family names after screening. The people on the list were randomly selected using a random number table and approached by the researcher during home visits to confirm the study eligibility and ask for consent for participation. The block randomisation with a block size of four or six and sealed opaque envelopes labelled with group (number) were adopted to ensure the randomisation and allocation concealment, respectively. An independent research assistant prepared the randomisation schedule and sealed opaque

envelopes. The randomisation sequence was generated from an online randomisation programme (<https://www.sealedenvelope.com>). After baseline measurement, participants opened the sealed envelope and were allocated to either the intervention or the control group, which was concealed from the outcome assessors, as well as the clinic staff. The inclusion criteria for people with hypertension were as follows:

- (1) Those aged 18 years or above.
- (2) Having essential hypertension without adequate BP control (SBP \geq 140 mmHg and/or DBP \geq 90 mmHg). Essential hypertension was confirmed by examining the patient's medical records in the village clinics. When "essential" was not clearly marked, the village doctor would check against the patient's medical information in the clinic for interpretation and confirmation.
- (3) Living with one or more family members.
- (4) Speaking Mandarin or local dialect.

People were excluded if they were as follows:

- (1) Diagnosed with a terminal illness (e.g., cancer, end-stage renal disease, and severe heart failure)
- (2) Diagnosed with a mental disorder, including dementia, schizophrenia, etc.
- (3) Diagnosed with stroke or COPD
- (4) Having physical disability, which was defined as needing assistance with or inability in any of the six activities of daily living (e.g., toilet, feeding, dressing, grooming, physical ambulation, or bathing) in the Physical Self-maintenance Scale [29]
- (5) Living alone
- (6) Participating or having participated recently in a structured hypertension management programme in the last six months

A family carer is a member of a family with a kinship, marital, or coresidence relationship involved in a patient's daily health care [30]. Each person nominated one family carer for participation by asking two questions in the sociodemographic datasheet: (1) "Do you have family member(s) who get involved with your health care in helping with medications, blood pressure monitoring, clinic visits, smoking cessation, alcohol control, weight loss, healthy diet, sodium restriction, or physical activity?"; and (2) "How long do you two spend together every day on average"? The family member who provided more assistance and stayed longer time was selected as the family carer to be enrolled in this study.

The family carers were included if they were as follows:

- (1) Aged 18 years or above
- (2) Blood, by-marriage, or coresidence relatives of the patient
- (3) Contactable by phone or WeChat

Conversely, the carers were excluded if they were as follows:

- (1) Having a severe mental disorder such as dementia, schizophrenia, acute or severe depression/anxiety disorders, and/or learning disorder
- (2) Taking care of two or more patients in the family
- (3) Diagnosed with hypertension

2.3. Sample Size. The sample size was estimated with reference to the effect sizes on the primary outcomes (change in SBP, DBP, and proportion of normal controlled BP) in similar studies. In our previous systematic review [22], the Cohen's effect size (d) of family dyad-oriented psycho-educational intervention for hypertensive people on changes in SBP and DBP was 0.59 and 0.57, respectively, at short-term (immediately to three months) postintervention. From the results, the sample size could be 94 and 100, respectively, with a two-group comparison test such as *t*-test (two-tailed) with 80% power at the statistically significant level of 5%, by using G*Power [31]. Moreover, the results of our previous systematic review reported attrition rates between 0% and 19.77%, and most studies had an attrition rate below 10% (13 out of the 15 included studies) [22]. Furthermore, the pilot study of this RCT indicated an attrition rate of 4.55% [32]. Therefore, an attrition rate of 10% was used, and the final sample size was 110 family dyads (i.e., 55 for each group).

2.4. Intervention Group. The people with hypertension and their family carers received the patient-family (carer) partnership intervention (PFPI), which were five individual-based, biweekly face-to-face training sessions. We conducted a pilot study to test the feasibility, acceptability, and preliminary effect of the patient-family (carer) partnership intervention for people with hypertension in a Chinese rural community. The findings of this pilot study indicated that the PFPI was a feasible and acceptable programme, as reflected by its high recruitment and intervention and study-completion rates, as well as positive feedback and perceived benefits from the participants. The results of the pilot study and the structure, content, format, and components of the PFPI have been published somewhere [32]. Improvements in the intervention in current RCT were made based on the findings of pilot study. Table 1 outlines the protocol of the PFPI.

In this study, the PFPI was delivered by the first author, who is a registered nurse and has research experience in chronic disease management (e.g., cardiovascular disease, stroke, and diabetes) in rural communities. Moreover, the researcher could speak the local language of the participants and was familiar with their local culture. This familiarity could facilitate the researcher-participant communication in the delivery of the intervention and in sample recruitment.

2.5. Control Group. Participants in the control and intervention groups received usual care delivered by a village doctor during home visits every three months following government regulations: the village doctor monitored BP, provided advice on hypertension self-care, and responded to people's questions about hypertension management during

TABLE 1: Protocol of the patient-family carer partnership intervention (PFPI).

Session no. and name	Week no.	Time (min)	Main contents
Session 1 information giving	Week 1	30	<p>(i) Measure BP</p> <p>(ii) Inform dyad about the pharmacological therapy</p> <p>(iii) Inform dyad about criteria of healthy behaviours regarding hypertension management</p> <p>(iv) Guide the dyad to identify the patient's problem behaviours</p> <p><i>Tool:</i> Hypertension management booklet (see supplementary file 2)</p> <p>(i) Measure BP</p> <p>(ii) Dyad reports the progress of behaviour modification</p> <p>(iii) Discuss with the family carer about issues in caring for and living with a family member with hypertension and his/her role as a family carer in hypertension management</p> <p>(iv) Communication skills training</p> <p>(1) Encourage the patient to share his/her symptoms and feelings</p> <p>(2) Use didactic teaching and role-playing with case scenario to train dyad's communication skills in behaviour change, including listening fully and actively, reducing controlling, criticizing, or guilt provoking language, providing the rationale for self-management behaviours, expressing empathy and concern, enhancing choice, and expressing appreciation</p> <p>(v) Encourage the family carer (using the learned communication skills) to help patient implement behaviour change in daily life</p> <p><i>Tool:</i> Case scenarios</p>
Session 2 communication skills training	Week 3	30	<p>(i) Measure BP</p> <p>(ii) Dyad reports the progress of behaviour modification</p> <p>(iii) Assess dyad's implementation of learned communication techniques in daily hypertension care and session</p> <p>(1) Ask the family carer to provide examples of using the learned communication techniques in hypertension care</p> <p>(2) Observe the dyad's communication in session to confirm their communication issues</p> <p>(3) Discuss the issues of using communication techniques in hypertension care in the recent two weeks</p> <p>(4) Further training of communication techniques is provided with additional case scenarios and by further discussion</p> <p>(5) The identified communication issues are recorded in the "checklist of partnership skills implementation in sessions and daily life"</p> <p>(iv) Decision-making techniques training</p> <p>(1) Identify problem behaviours and set goals</p> <p>(2) Discuss the influence of behaviour change</p> <p>(3) Discuss the difficulties of behaviour change and identify the coping strategy</p> <p>(4) Discuss ways to seek information and help when needed</p> <p>(5) Identify an action plan. The dyad is guided by an "action plan for behaviour change worksheet" to develop the plan for actions</p> <p>(v) Encourage the dyad to implement the decision-making techniques and the action plan in daily life</p> <p><i>Tools:</i> An action plan for behaviour change worksheet; checklist of partnership skills implementation in sessions and daily life</p>
Session 3 decision-making techniques training	Week 5	30	<p>(i) Measure BP</p> <p>(ii) Dyad reports the progress of behaviour modification</p> <p>(iii) Assess dyad's implementation of learned communication techniques in daily hypertension care and session</p> <p>(1) Ask the family carer to provide examples of using the learned communication techniques in hypertension care</p> <p>(2) Observe the dyad's communication in session to confirm their communication issues</p> <p>(3) Discuss the issues of using communication techniques in hypertension care in the recent two weeks</p> <p>(4) Further training of communication techniques is provided with additional case scenarios and by further discussion</p> <p>(5) The identified communication issues are recorded in the "checklist of partnership skills implementation in sessions and daily life"</p> <p>(iv) Decision-making techniques training</p> <p>(1) Identify problem behaviours and set goals</p> <p>(2) Discuss the influence of behaviour change</p> <p>(3) Discuss the difficulties of behaviour change and identify the coping strategy</p> <p>(4) Discuss ways to seek information and help when needed</p> <p>(5) Identify an action plan. The dyad is guided by an "action plan for behaviour change worksheet" to develop the plan for actions</p> <p>(v) Encourage the dyad to implement the decision-making techniques and the action plan in daily life</p> <p><i>Tools:</i> An action plan for behaviour change worksheet; checklist of partnership skills implementation in sessions and daily life</p>

TABLE 1: Continued.

Session no. and name	Week no.	Time (min)	Main contents
Session 4 reciprocity techniques training	Week 7	30	<p>(i) Measure BP</p> <p>(ii) Dyad reports the progress of behaviour modification</p> <p>(iii) Reciprocity techniques training</p> <p>(1) Discuss the existing and potential assistance provided by the family carer and received by the patient in behaviour change</p> <p>(2) Discuss issues of giving and receiving assistance and explore the strategies</p> <p>(3) Express gratitude. Dyad is asked to present his/her obtained achievements and to express their congratulations and gratitude to each other for their achievements</p> <p>(iv) Assess dyad's implementation of learned decision-making techniques in hypertension care</p> <p>(v) Encourage dyad to implement reciprocity techniques in hypertension care</p> <p><i>Tools:</i> An action plan for behaviour change worksheet; checklist of partnership skills implementation in sessions and daily life</p>
Session 5 review	Week 9-10	30	<p>(i) Measure BP</p> <p>(ii) Dyad reports the progress of behaviour modification</p> <p>(iii) Assess the implementation of learned reciprocity techniques in daily life</p> <p>(iv) Review</p> <p>(1) Review the contents of the last four sessions</p> <p>(2) Review the issues of building a positive partnership that arose in previous sessions</p> <p><i>Tools:</i> Hypertension management booklet; an action plan for behaviour change worksheet; checklist of partnership skills implementation in sessions and daily life</p>

home visits. The BP values collected were uploaded to the hypertension follow-up system managed by the Health Bureau of Liuyang City. The village doctors did not prescribe antihypertensive drugs during home follow-up. Patients who needed prescriptions were referred to visit the village clinic or other regional clinics/hospitals for medical care.

2.6. Instruments

2.6.1. Demographic Data Form. The demographic data form was developed and used to collect the sociodemographic and clinical characteristics of people with hypertension and their family carers. The sociodemographic and clinical information of people with hypertension included age, gender, marital status, employment status, education level, body mass index (BMI), smoking status, alcohol status, physical exercise, medical insurance, annual family income, family structure/unit, duration of hypertension, and comorbidities. The family carers' age, gender, marital status, employment status, education level, BMI, smoking status, alcohol status, medical diseases, and the relationship with patient were also collected.

2.6.2. Measure for Outcomes Variables

(1) BP Measurement. The method and procedure for measuring BP followed the Chinese hypertension management guideline [33]. Before starting to measure BP, the patients sat quietly in a chair, feet on the floor, and back supported, for at least 5 minutes; exercise and smoking were avoided for at least 30 minutes before measurement; the bladder was emptied; and the patient's arm was supported (resting on a desk). The middle of the cuff was placed on the patient's upper arm in the same horizontal position as the right atrium which is at the midpoint of the sternum. The correct cuff size adhering to Whelton et al. [34] recommendation was used. An electronic upper-arm sphygmomanometer (OMRON HEM-752) with a validated measurement protocol and the results have been published in a peer-reviewed journal was used to measure BP [35]. BP was measured in both arms, and the arm with a higher BP reading was used for all subsequent BP measurements. BP measurement was repeated at an interval of 1 min, and the mean value of two readings was recorded. If the difference between two readings of SBP or DBP was more than 5 mmHg, it was measured again, and the average value of three readings was recorded [33].

(2) Proportion of People with Normal BP. The number of hypertensive people with normal BP at each assessment divided by the total number of hypertensive people enrolled in the group resulted in the proportion of people with well-controlled or normal BP at that time of measurement. According to the Chinese hypertension management guideline [33], the normal BP level of Chinese adults was below 140/90 mmHg (i.e., both SBP and DBP should achieve this norm-based standard); for patients aged 65 years or

above, a normal BP should be less than 150/90 mmHg; and for patients with diabetes, it should be less than 130/80 mmHg. The determination of normal BP control was based on the current BP reading taken by the researcher/data collector in T0, T1, and T2.

(3) Antihypertensive Drug-Treatment Rate. The assessor asked participants a single question (e.g., "Have you taken any antihypertensive drugs prescribed by your doctor in the past two weeks?") to collect data about the antihypertensive drug usage in the past two weeks. The antihypertensive drug-treatment rate refers to the percentage of total number of patients took antihypertensive drugs (in the past two weeks) among the hypertensive patients who participated in this study.

(4) Antihypertensive Drug-Titration Rate. The assessor asked participants the question "Have your antihypertensive drugs prescription been adjusted by your doctor in the past two months?" to collect data about the titration of the antihypertensive drug. The antihypertensive drug-titration rate refers to the percentage of the total number of patients who had drug titration (in the past two months) among the hypertensive patients who participated in this study.

(5) Hypertension Self-Care Profile (HBP SCP). Three scales are included in HBP SCP (behaviour, motivation, and self-efficacy), which can be used together or independently. In this study, the Behaviour and Self-efficacy subscales in the HBP SCP were used to measure hypertensive people's self-care behaviour and self-efficacy, respectively. Each subscale contains 20 items rated on a four-point scale; a higher score indicates a high level of self-care behaviour or self-efficacy. The Chinese version of HBP SCP revealed good psychometric properties in the Chinese hypertensive population. Cronbach's alpha coefficients of the Behaviour and Self-efficacy subscale were 0.86 and 0.93, respectively. Moderate correlations were identified between HBP SCP subscales and Treatment Adherence Questionnaire for Hypertension (TAQPH) scales ($r=0.45, 0.61, 0.65$, all $p<0.001$) [36].

(6) Dyadic Relationship Scale (DRS). A Chinese version of the DRS was used to measure the family dyad's partnership quality. It comprised two separate versions, namely, the Patient and the Caregiver version, to evaluate both the patients' and caregivers' perceptions towards the impacts of family care on positive and negative (dyadic strain) interactions [37]. The Patient and Caregiver versions of the DRS were rated on a four-point Likert scale, from 0 (strongly agree) to 3 (strongly disagree). A lower score of the two versions indicated better perceived dyadic relationships by patients and their family carers, respectively. The Chinese versions were tested with 132 hypertensive people and their family carers in China, with good internal consistency (Cronbach's alphas=0.82 and 0.83 for the Patient and Caregiver version, respectively), positive correlations with the self-efficacy subscale of the Hypertension Self-Care Profile and Zarit Burden Interview schedule (Pearson's $r=0.70$ and 0.79 , respectively; both $p<0.001$), and test-

retest reliability (ICC = 0.97 and 0.96, both $p < 0.01$) (Zeng, Yang, and Chien, 2022).

(7) *Patient Health Questionnaire-9 (PHQ-9) and Generalised Anxiety Disorder Scale-7 (GAD-7)*. The PHQ-9 and GAD-7 are efficient tools for measuring perceived depressive and anxiety symptoms, respectively. Items in PHQ-9 and GAD-7 are rated on a four-point Likert scale from 0 “never” to 3 “almost every day;” and the higher scores of both scales indicated more severe symptoms of depression and anxiety, respectively. Cronbach’s alpha coefficient of the Chinese version of PHQ-9 was 0.82 in Chinese rural elderly [38]. The GAD-7 has been translated into a Chinese version and validated in general hospital outpatients, with a Cronbach’s alpha coefficient of 0.90 and test-retest reliability of 0.86 [39].

(8) *EuroQol Five-Dimensional-Five-Level (EQ-5D-5L)*. EQ-5D-5L, including the descriptive system and the EQ visual analogue scale (EQ-VAS), was adopted to evaluate participants’ HRQoL. Five dimensions of individual health condition (e.g., mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) were measured by the descriptive system using five items with a five-point Likert scale from 0—“No” to 5—“Extreme”. The mainland China set value of EQ-5D-5L was used to convert the ratings on five dimensions into a single value, in which a higher score represented poorer HRQoL [40]. The EQ-VAS was a 20 cm vertical, visual analogue scale rating on one’s overall health, with an endpoint between 0 (worst imaginable health state) and 100 (best imaginable health state). In Chinese patients with chronic illnesses, Cohen’s kappa for the test-retest reliability of the self-classifier ranged from 0.41 to 1.00. Validity was demonstrated using known-group construct validity: seven of 10 priori hypotheses relating the EQ-5D dimensions to SF-36 dimensions were fulfilled [41].

2.7. Process Evaluation. A checklist of all items of the intervention protocol to check/monitor the intervention fidelity was used by the researcher during each session to monitor the intervention implementation (see supplementary file 1). The family dyads’ adherence to the partnership techniques in daily hypertension care is difficult to assess. In this study, strategies, such as behaviour observation during sessions and reporting and the feedback sought from the participants (dyads), were used to assess the family dyad’s adherence to the learned partnership and related techniques in daily hypertension care. For example, the researcher asked the family dyad to provide examples of the communication, decision-making, and reciprocity used in hypertension care [28] and observed the dyad’s communication styles and patterns during the training sessions. The identified partnership issues were recorded in the “checklist of partnership skills implementation during training sessions and daily life.” Each identified partnership issue was listed and marked as “implemented” or “non-implemented/inappropriately implemented” by the researcher. Further training was implemented in the next or subsequent sessions to address the “non-implemented/inappropriately implemented” skills.

2.8. Data Collection. The researcher reviewed a total of 702 patients’ medical records in two village clinics (387 and 315 records per clinic) under study at Liuyang City, Hunan Province, China, between July and August 2020 and created a list of 530 potential participants in alphabetical order of their family names. There were 180 (33.96%) patients on the list, who were randomly selected and approached during home visits to confirm the study eligibility and ask for consent for participation. After visiting 137 patients, 110 eligible family dyads (patients and their family carers) agreed to participate in the study. The 110 dyads were randomly assigned to either the intervention or control group in equal total numbers in each group, that is, with 55 dyads per group. The recruitment was conducted by the researcher.

Written informed consent was obtained from the participants who agreed to participate in this study. Then, the researcher collected the baseline data (T0). For the participants who could not read and understand the items/contents in instruments, the researcher/assessors read and explained the items and recorded participants’ responses to each item.

The researcher delivered the ten-week PFPI from August to October 2020. Postintervention data collection was conducted through home visits at 1-month (T1, November 2020) and 3-month (T2, January 2021) postintervention by a retired village doctor who was blinded to the group allocation. The retired village doctor was trained (in the village clinic) by the researcher to develop skills in data collection. Five hypertensive people were invited to participate in the training session. Peer assessments were performed on these five people with hypertension to ensure BP measurement consistency between the researcher and the assessor. An explanation of the instruments was provided during the assessor training. Considering some of the participants in the rural communities were illiterate, the assessor practiced reading and interpreting each item in the instruments to the participants. The practices for data collection were conducted in the training session until the assessor was competent to collect the data independently.

2.9. Data Analysis. IBM SPSS version 25.0 (IBM Corp. Armonk, NY, USA) was used for data analysis. Data cleaning was adopted to ensure data quality and study validity. All statistic tests involved were two-sided with the statistically significant level set at 0.05. Descriptive statistics were used to summarise the participants’ demographic and clinical characteristics and outcome variables. The assessment of normality for the continuous variables was conducted using Q-Q plot, skewness, and kurtosis statistics.

Chi-square tests and independent *t*-tests were adopted to test the homogeneity of the sample at baseline measurement. Chi-square test or Fisher’s exact test was used for categorical variables. Independent *t*-tests were applied for the continuous variables that followed a normal distribution.

Intention-to-treat (ITT) analysis was used for data or outcome analysis. ITT analysis method could preserve the sample size and statistical power, thereby resulting in a more accurate, unbiased estimation of the effectiveness of an

intervention [42]. The generalised estimating equation (GEE) model was adopted to analyse the group and time differences of individual outcome variables. In the current study, the data collected at three different time points within the same subject were usually auto-correlated. Therefore, the AR(1) model was selected as working matrices in GEE analyses. The GEE model can be applied when the data missing completely at random (MCAR) [43]. In this study, the results of Little's MCAR test ($\chi^2 = 108.949$, $DF = 148$, $p = 0.993$) supports the MCAR and GEE can be used.

In the GEE analyses, the interaction (group \times time) treatment effects were included in the GEE model to examine the changes in each outcome between the intervention and control groups across the three time points. When the interaction treatment effect was statistically significant in the GEE analysis, pairwise contrast tests were used to identify any statistically significant mean score differences in each outcome measure between groups at postintervention time points (T1 and T2).

Incorporating covariates into the GEE model could minimise the bias of confounding variables and safeguard the statistical power of the intervention effects [44]. In this study, potential covariates were identified based on the results of comparisons for sociodemographic and clinical characteristics and outcome variable scores at baseline between the intervention and control groups. Variables with $p < 0.1$ were considered as potential covariates and adjusted in the GEE model [45].

2.10. Ethical Considerations. This study was conducted in compliance with the principles outlined in the Declaration of Helsinki. Approvals for this study were obtained from the University Cluster Clinical Research Ethics Committee (CREC Ref. No.: 2019.375). Access permission for this study from the village clinic under study was also obtained. Participant recruitment was followed the voluntary principle. Each potential participant (hypertensive people and their family carers) received a detailed introduction about the study. Informed written consent was obtained from all individual participants before collecting any data. All participants had the right to refuse to participate or withdraw from the study without any influence on usual care services provided by clinical doctors. All data collected were anonymous, kept confidential, and used for research purposes only. The participants were not in any way identifiable in the research reports.

3. Results

110 eligible family dyads (patients and their family carers) participated in the study. Within one month after the intervention (T1), one person with hypertension in the intervention group died after baseline data collection; one family dyad from the control group moved to the city to live with their son. Therefore, the two groups shared the same attrition rate of 1.82% at T1. At three months post-intervention (T2), one person with hypertension died after T1 in both groups; one dyad in the intervention group and

two dyads in the control group were out of villages at the time-point of T2. Therefore, the attrition rates at T2 were 5.45% ($n = 3$) for the intervention group and 7.27% ($n = 4$) for the control group; hence, the attrition rate of the study was 6.36% ($n = 7$) at T2. Figure 2 illustrates the flowchart of participants' recruitment, group allocation, and number and reasons for withdrawals.

3.1. Demographic and Clinical Characteristics. Table 2 presents the demographic and clinical characteristics of people with hypertension. The mean age was 67.65 years ($SD = 11.53$). The majority of them were female (60.91%, $n = 67$), married (72.73%, $n = 80$), and farmers (93.36%, $n = 106$). 30.00% of the people with hypertension were illiterates ($n = 33$). The mean BMI was 23.52 kg/m² ($SD = 3.61$). About 15% ($n = 17$) and 35% ($n = 39$) were currently drinking and smoking, respectively. More than half of the people with hypertension (54.55%, $n = 60$) took part in farm work. Their average duration of hypertension was 6.25 years ($SD = 3.64$). About two-thirds of people with hypertension had at least one comorbidity (60.91%, $n = 67$), from whom one-third of them were diagnosed with diabetes (29.09%, $n = 32$). No statistically significant differences were observed in the demographic and clinical characteristics of people with hypertension between the two groups (p values ranged from 0.06 to 1.00).

The demographic characteristics of family carers are summarised in Table 3. About two-thirds of the family carers were spouses of people with hypertension (67.27%, $n = 74$). The average age of family carers was 59.51 years ($SD = 9.53$), and nearly two-thirds of them (61.82%, $n = 68$) were male. The majority of them completed at least primary school education (66.36%, $n = 73$) and farmers (89.09%, $n = 98$). Their average BMI was 24.91 kg/m² ($SD = 2.78$). About half of them (49.09%, $n = 54$) had one or more medical illnesses. Neither the Chi-square tests nor t -tests identified statistically significant differences in the demographic and clinical characteristics of family carers between the two groups.

3.2. Outcome Variables at Baseline. The mean scores or frequencies/percentages of the outcome variables are summarised in Table 4. At baseline (T0), the mean SBP values for both study groups were above the normal level of SBP (90–140 mmHg), and the mean DBP values were normal (60–90 mmHg). People with hypertension in the two groups had similar mean score of DRS-C-PT, 12.60 ($SD = 3.45$) for the intervention group and 12.22 ($SD = 3.90$) for the control group. The results of independent t -tests showed no statistically significant differences between groups in the outcome variables of people with hypertension, including SBP, DBP, dyadic-relationship quality, self-care, self-efficacy, depressive symptoms, anxiety symptoms, and health-related quality of life at T0, with p values ranging from 0.29 to 0.89; the Chi-square tests did not identify any statistically significant differences in antihypertensive drug-treatment rate ($p = 0.70$) and the rate of hypertensive drugs titration ($p = 0.54$) at T0.

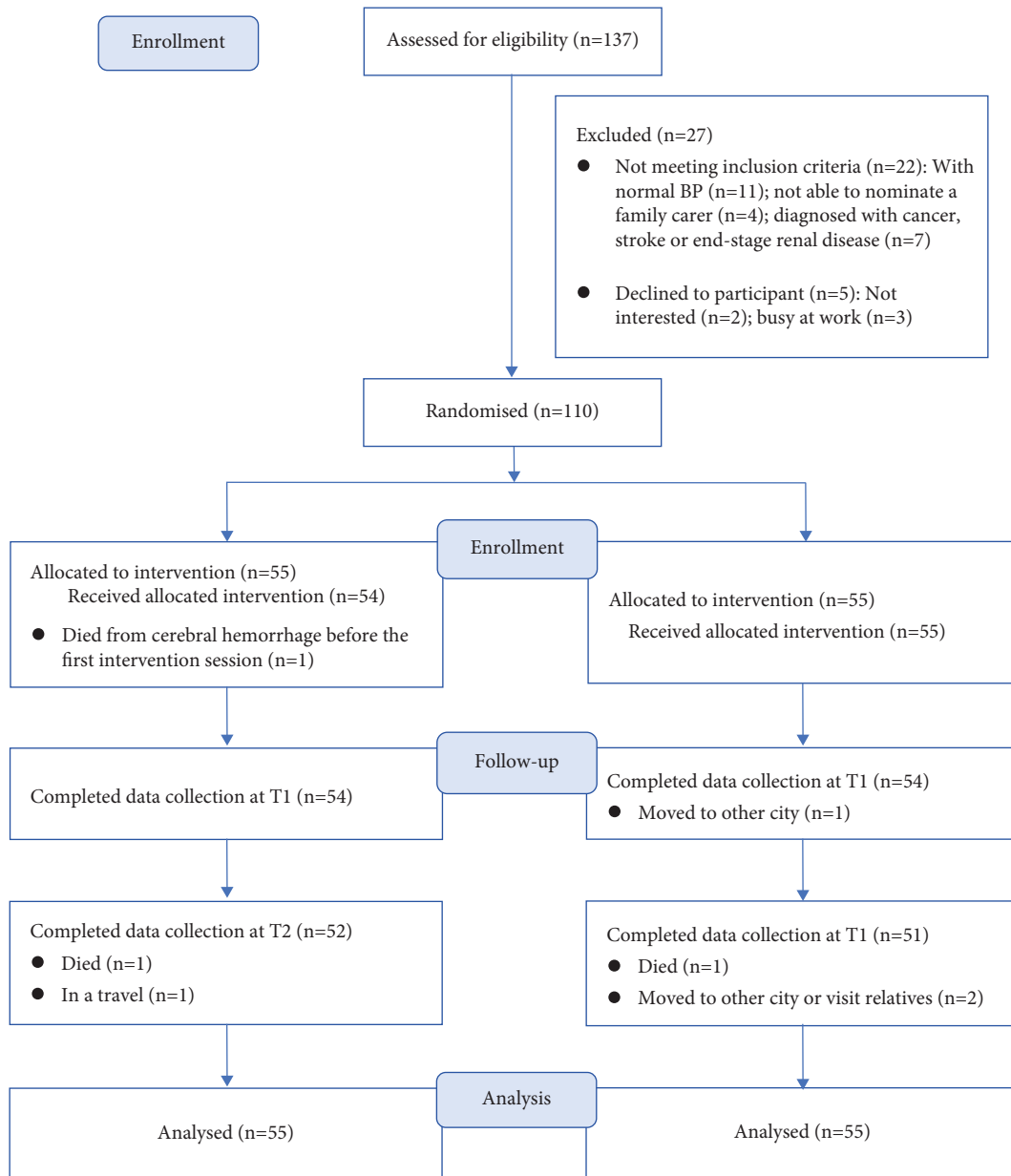


FIGURE 2: The flowchart of participant recruitment and allocation.

TABLE 2: Baseline characteristics of people with hypertension in the intervention and control groups ($n = 110$).

Characteristics	Intervention group ($n = 55$)	Control group ($n = 55$)	χ^2/t	p
Gender			$\chi^2 = 0.34$	0.56
Male	23 (41.82)	20 (36.36)		
Female	32 (58.18)	35 (63.64)		
Age (year)	67.24 ± 12.33	68.05 ± 10.75	$t = 0.37$	0.71
Marital status			$\chi^2 = 0.73$	0.39
Married	37 (67.27)	42 (76.36)		
Single/Divorced/Widowed	17 (32.73)	13 (23.64)		
Job nature				1.00 [†]
Farmer	53 (96.36)	53 (96.36)		
Others (e.g., businessman or factory worker)	2 (3.64)	2 (3.64)		
Educational level			$\chi^2 = 1.09$	0.58
Illiteracy	17 (30.91)	16 (29.09)		
Primary school	31 (56.36)	35 (63.64)		
Secondary or above	7 (12.73)	4 (7.27)		

TABLE 2: Continued.

Characteristics	Intervention group (n = 55)	Control group (n = 55)	χ^2/t	<i>p</i>
Body mass index (BMI) [@]	23.43 ± 3.52	23.61 ± 3.73	<i>t</i> = 0.27	0.79
Alcohol drinking			$\chi^2 = 0.16$	0.92
Never	35 (63.64)	37 (67.27)		
Quitted (≥6 months)	11 (20)	10 (18.18)		
Currently drinking	9 (16.36)	8 (14.55)		
Smoking			$\chi^2 = 1.03$	0.60
Never	30 (54.55)	35 (63.64)		
Quitted (≥6 months)	3 (5.45)	3 (5.45)		
Currently smoking	22 (40)	17 (30.91)		
Did you do farm work at least once in the last seven days?			$\chi^2 = 0$	1.00
Yes	30 (54.55)	30 (54.55)		
No	25 (45.45)	25 (45.45)		
Did you have physical exercises at least once in the last seven days?				1.00 [†]
Yes (running/jogging)	2 (3.64)	1 (1.82)		
No	53 (96.36)	54 (98.18)		
Annual family income (Yuan) [§]			$\chi^2 = 5.52$	0.06
10,000–20,000	18 (32.73)	12 (21.82)		
20,000–50,000	25 (45.45)	37 (67.27)		
≥50,000	12 (21.82)	6 (10.91)		
Family structure			$\chi^2 = 0.15$	0.70
Nuclear family*	22 (40)	24 (43.64)		
Stem family*	33 (60)	31 (56.36)		
Medical insurance				
New cooperative medical scheme ^{&}	55 (100%)	55 (100%)		
Duration of hypertension (year)	6.58 ± 3.73	5.91 ± 3.55	<i>t</i> = - 0.97	0.34
Number of comorbidities			$\chi^2 = 0.63$	0.73
0	20 (36.36)	23 (41.82)		
1	29 (52.73)	28 (51.91)		
≥2	6 (10.91)	4 (7.27)		
Diabetes mellitus			$\chi^2 = 0.71$	0.40
Yes	18 (32.73)	14 (25.45)		
No	37 (67.27)	41 (74.55)		
Have you taken antihypertensive drugs in the past two months?			$\chi^2 = 1.33$	0.25
Yes	34 (61.82)	28 (50.91)		
No	21 (38.18)	27 (49.09)		

Note. [@]BMI is calculated by dividing the weight in kilograms by the square of the height in meters (kg/m²). [†]Tested by Fisher's exact test. [§]1 Yuan = 0.15 US dollars. Two patients with family incomes below 10,000 yuans were included in the "10,000–20,000 yuan" group. *Nuclear family refers to a family group consisting of a married couple with or without children. *Stem family refers to those families being made up of three generations, that is, a couple and a married child with children. [&]New Cooperative Medical Scheme is a voluntary and governmentally organized scheme largely financed through government subsidisation. It aims to ensure China rural residents can receive basic healthcare services.

TABLE 3: Baseline characteristics of family carers in two study groups (n = 110).

Characteristics	Intervention group (n = 55)	Control group (n = 55)	χ^2/t	<i>p</i>
Relationship with the patients			$\chi^2 = 1.02$	0.31
Spouse	34 (61.82)	39 (70.91)		
Son/son-in-law/daughter/daughter-in-law	21 (38.18)	16 (29.09)		
Gender			$\chi^2 = 0.62$	0.43
Male	32 (58.18)	36 (65.45)		
Female	23 (41.82)	19 (34.55)		
Age	59.27 ± 9.07	59.75 ± 10.05	<i>t</i> = 0.26	0.80
Marital status			$\chi^2 = 0.21$	0.65 [†]
Married	53 (96.36)	52 (94.55)		
Single/Divorced	2 (3.64)	3 (5.45)		
Employment nature			$\chi^2 = 1.50$	0.22
Farmer	47 (85.45)	51 (92.73)		
Others (e.g., businessman or service workers or workers in factories)	8 (14.55)	4 (7.27)		

TABLE 3: Continued.

Characteristics	Intervention group (n = 55)	Control group (n = 55)	χ^2/t	<i>p</i>
Educational level			$\chi^2 = 2.33$	0.31
Illiteracy	7 (12.73)	4 (7.27)		
Primary school	38 (69.09)	35 (63.64)		
Secondary or above	10 (18.18)	16 (29.09)		
Body mass index (BMI)	24.72 ± 2.83	25.06 ± 2.75	<i>t</i> = 0.65	0.52
Alcohol drinking status			$\chi^2 = 0.59$	0.74
Never	27 (49.09)	23 (41.82)		
Quitted (≥6 months)	12 (21.82)	14 (25.45)		
Currently drinking	16 (29.09)	18 (32.73)		
Smoking status			$\chi^2 = 2.44$	0.26 [†]
Never	23 (41.82)	20 (36.36)		
Quitted (≥6 months)	4 (7.27)	1 (1.82)		
Currently smoking	28 (50.91)	34 (61.82)		
Number of comorbidities			$\chi^2 = 0.70$	0.74 [†]
0		30 (54.55)		
1-2	26 (47.27)	21 (38.18)		
>2	25 (45.45)	4 (7.27)		
Diabetes mellitus			$\chi^2 = 0.53$	0.47
Yes	4 (7.27)	12 (21.82)		
No	9 (16.36)	46 (83.64)		

Note. [†]Tested by Fisher's exact test.

TABLE 4: Outcome variables of the hypertensive patients and family carers in PFPI and control groups at T0, T1, and T2.

Outcomes (instruments)	PFPI (mean ± SD)	Control group (mean ± SD)	Effect size (Cohen's <i>d</i> /OR)	Comparison of groups at T0	
				<i>t</i> / χ^2	<i>p</i>
Patients:					
SBP					
T0	154.51 ± 9.43	156.6 ± 10.99		1.07	0.29
T1	144.56 ± 9.48	153.50 ± 13.38	0.77 (medium)		
T2	141.44 ± 8.90	151.18 ± 12.02	0.92 (large)		
DBP					
T0	82.27 ± 10.47	83.78 ± 12.67		0.68	0.50
T1	77.91 ± 8.68	82.39 ± 11.63	0.44 (small)		
T2	76.96 ± 8.41	81.75 ± 11.74	0.47 (small)		
People with normal BP					
T0	0	0			
T1	13 (23.64%)	9 (16.36%)	1.58		
T2	23 (41.82%)	9 (16.36%)	3.67		
Dyadic-relationship quality (DRS-C-PT)					
T0	12.60 ± 3.45	12.22 ± 3.90		-0.55	0.58
T1	10.48 ± 2.75	12.22 ± 3.89	0.52 (medium)		
T2	10.06 ± 2.73	12.16 ± 3.70	0.65 (medium)		
Self-care (HBP SCP-Behaviour)					
T0	45.87 ± 5.35	46.89 ± 5.88		0.95	0.34
T1	52.26 ± 5.84	48.04 ± 6.35	0.69 (medium)		
T2	52.06 ± 5.68	48.24 ± 5.99	0.65 (medium)		
Self-efficacy (HBP SCP-Self-efficacy)					
T0	52.84 ± 5.75	53.35 ± 6.64		0.43	0.67
T1	56.06 ± 5.85	53.94 ± 7.08	0.33 (small)		
T2	56.81 ± 6.28	54.65 ± 7.46	0.31 (small)		
Antihypertensive drug-treatment rate [#]					
T0	29 (52.73%)	31 (56.36%)		0.15	0.70
T1	38 (69.09%)	33 (60.00%)	1.49		
T2	39 (70.91%)	34 (61.82%)	1.51		

TABLE 4: Continued.

Outcomes (instruments)	PFPI (mean ± SD)	Control group (mean ± SD)	Effect size (Cohen's <i>d</i> /OR)	Comparison of groups at T0	
				<i>t</i> / χ^2	<i>p</i>
Hypertensive drug-titration rate [#]					
T0	7 (12.73%)	5 (9.09%)		0.38	0.54
T1	17 (30.91%)	2 (3.64%)	11.81		
T2	20 (36.36%)	3 (5.45%)	9.91		
Depressive symptoms (PHQ-9)*					
T0	4.00 (3.00–6.00)	4.00 (3.00–7.00)		0.73	0.47
T1	3.00 (2.00–5.00)	3.50 (2.00–6.25)	0.48 (small)		
T2	3.00 (2.00–5.00)	3.00 (2.00–6.00)	0.33 (small)		
Anxiety symptoms (GAD-7)*					
T0	2.00 (2.00–4.00)	3.00 (2.00–4.00)		0.80	0.43
T1	2.00 (1.00–3.00)	2.00 (2.00–4.00)	0.52 (medium)		
T2	2.00 (1.00–2.75)	2.00 (2.00–4.00)	0.48 (small)		
Health-related quality of life (EQ-5d-5L index score)					
T0	0.88 ± 0.06	0.88 ± 0.08		–0.46	0.65
T1	0.92 ± 0.05	0.88 ± 0.07	0.66 (medium)		
T2	0.92 ± 0.05	0.89 ± 0.07	0.49 (small)		
Health-related quality of life (EQ-VAS)					
T0	72.16 ± 8.91	70.18 ± 10.41		–1.07	0.29
T1	76.35 ± 7.78	71.30 ± 8.67	0.61 (medium)		
T2	76.50 ± 7.97	72.16 ± 8.89	0.51 (medium)		
Family carers:					
Dyadic-relationship quality (DRS-C-CG)					
T0	15.02 ± 5.35	14.76 ± 4.48		–0.27	0.79
T1	12.50 ± 4.24	14.06 ± 4.36	0.36 (small)		
T2	12.15 ± 4.00	13.47 ± 4.63	0.31 (small)		
Depressive symptoms (PHQ-9)					
T0	2.65 ± 1.42	2.69 ± 1.57		0.13	0.90
T1	2.13 ± 1.21	2.37 ± 1.39	0.18 (small)		
T2	2.04 ± 1.10	2.41 ± 1.42	0.29 (small)		
Anxiety symptoms (GAD-7)					
T0	2.27 ± 1.31	2.09 ± 1.67		–0.64	0.53
T1	1.69 ± 0.97	2.17 ± 1.22	0.44 (small)		
T2	1.54 ± 0.96	1.86 ± 1.30	0.28 (small)		
Health-related quality of life (EQ-5D-5L index score)					
T0	0.92 ± 0.06	0.92 ± 0.06		0.94	0.95
T1	0.94 ± 0.04	0.92 ± 0.05	0.44 (small)		
T2	0.94 ± 0.04	0.92 ± 0.05	0.44 (small)		
Health-related quality of life (EQ-VAS)					
T0	75.45 ± 8.73	75.42 ± 9.39		–0.02	0.98
T1	78.70 ± 7.66	76.13 ± 7.82	0.33 (small)		
T2	78.83 ± 7.61	77.33 ± 7.60	0.20 (small)		

Note. OR, odds ratio; DRS-C-PT, Chinese version of Dyadic Relationship Scale (patient version); DRS-C-PT, Chinese version of Dyadic Relationship Scale (caregiver version); HBP SCP-Behaviour, Behaviour scale of Hypertension Self-Care Profile; HBP SCP-self-efficacy, Self-efficacy of Hypertension Self-Care Profile; PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalised Anxiety Disorder Scale-7; EQ-5D-5L, EuroQol five-dimensional five-level; EQ-VAS, EuroQol Visual Analogue scale. [#]Presented as *n* (%). *Presented as median (lower quartile, upper quartile).

All the outcome variables of family carers were computed using independent *t*-tests. There were no statistically significant differences between groups in family carers' dyadic-relationship quality, depressive symptoms, anxiety symptoms, and health-related quality of life at T0, with *p* values ranging from 0.44 to 0.98.

3.3. Effects of PFPI on People with Hypertension. The results of outcome variables for people with hypertension and family carers at T0, T1, and T2 are presented in Table 4. Most

of the outcome variables were normally distributed with standard skewness and kurtosis scores between –1.96 and +1.96 and the data points were approximately located on the diagonal line of the Q-Q plot. However, the scores of PHQ-9 and GAD-7 for patients were not normally distributed. The normality of the PHQ-9 and GAD-7 scores across the three data collection time points was met with logarithm transformation. The effect sizes for patients' continuous outcome variables at T1 were small to medium, with Cohen's *d* values ranging from 0.33 to 0.77; at T2, Cohen's *d* values ranged from 0.31 to 0.92. Regarding the

categorical outcome variables of patients, the odds ratio ranged from 1.49 to 11.81 at T1 and 1.51 to 9.91 at T2. For the outcome variables of family carers, the effect sizes were small, with Cohen's *d* values ranging from 0.18 to 0.44 at T1 and 0.20 to 0.44 at T2.

The results of GEE test (Table 5) indicated statistically significant interaction (group \times time) treatment effects on the study outcomes, including SBP, DBP, proportion of people with normal BP, DRS-C-PT, HBP SCP-Behaviour, HBP SCP-Self-efficacy, PHQ-9, GAD-7, EQ-5D-5L index score and EQ-VAS of people with hypertension with *p* values ranged from <0.001 to 0.04, between the two groups over three-month follow-up. Regarding the effects of PFPI on family carers, the results of the GEE test (Table 5) indicated statistically significant interaction treatment effects on GRS-C-CG, GAD-7, EQ-5D-5L index score, and EQ-VAS between groups over the three-month follow-up, with the *p* values ranged from <0.001 to 0.03.

Pairwise contrast tests in the GEE (Table 5) indicated that, compared with the control group, the people with hypertension in the intervention group reported statistically significant greater improvements in SBP, DBP, DRS-C-PT, HBP SCP-Behaviour, hypertension drug-titration rate, GAD-7, EQ-5D-5L index score, and EQ-VAS at T1 and T2; and in the proportion of people with normal BP, HBP SCP-Self-efficacy at T2. When compared with the control group, the family carers had statistically significant greater improvements in GRS-C-CG and EQ-5D-5L index score at T1 and T2, and in GAD-7 and EQ-VAS at T1.

4. Discussion

4.1. Effects on the Outcomes of People with Hypertension. We supported the study hypotheses that people with hypertension in the intervention group would show statistically significant greater improvements in SBP and DBP values, dyadic relationship, self-care, hypertensive drug-titration rate, anxiety symptoms, and HRQoL at both T1 and T2 and on the proportion of patients with normal BP and self-efficacy at T2, when compared with those in the control (usual care) group. However, the hypotheses concerned with statistically significant greater improvements on the proportion of people with normal BP and self-efficacy at T1 and on antihypertensive drug-treatment rate and depressive symptoms at both T1 and T2 were not supported.

4.1.1. SBP and DBP Values and the Proportion of People with Normal BP. The effect sizes of PFPI on SBP were medium (Cohen's *d* = 0.77) at T1 and large (Cohen's *d* = 0.92) at T2, whereas those on DBP were small at T1 and T2, with Cohen's *d* = 0.44 and 0.47, respectively. The findings of BP control are consistent with and more effective (in SBP and DBP reduction) than the results of our previous systematic review in which eight included RCTs of family dyad-oriented psychoeducational interventions reported that the SBP and/or DBP of people with hypertension statistically significant decreased at less than three months postintervention (medium pooled effect sizes of 0.59 and 0.57, respectively)

[22]. Furthermore, PFPI significantly improved the proportion of people with normal BP across the study period, from zero at baseline to 23.64% at T1 and 41.82% at T2. Among the studies included in our previous systematic review [22], four reported the effects of family support interventions on the proportion of people with normal BP. The improvements in the proportions of people with normal BP in these studies (15.8%–44.90%) were similar to those in the current study (23.64% at T1 and 41.82% at T2). The overall rate of well-controlled hypertension (SBP <130 mmHg and DBP <80 mmHg) in the USA in 2017–2018 was 39.64% [46]. Therefore, PFPI could be useful in improving the proportion of people with normal BP across rural areas, bringing it to the same level in developed countries.

People with hypertension in rural communities could not receive adequate healthcare services [7, 8]. In the current study, the clinic doctor (the only staff in the clinic) needs to provide nearly 300 home visits each month to all patients with hypertension and/or diabetes in the village. The large workload is not conducive to providing complete and effective hypertension care services. The family carers in the PFPI group were trained to supervise and assist in patients' medication intake, BP monitoring, and problem behaviour change and to record BP values and medication adherence in the booklet provided for reference to healthcare providers. Therefore, they were employed as surrogates for formal healthcare providers [47]. This assistance in hypertension care could alleviate the effect of the shortage of healthcare providers on hypertension management in rural areas [48]. Moreover, compared with the previous studies on family-oriented or family support intervention [48, 49], PFPI was delivered in face-to-face individual (for family dyad) sessions during home visits. The scattered living status and underdeveloped transportation in rural areas could prevent patients from actively seeking healthcare services. The healthcare service (e.g., PFPI) delivery format of home visits addresses the health disparities in seeking healthcare service for rural community residents due to long geographical distance.

The construct of SCM, which was adopted for PFPI development in this study, could interpret the statistically significant effect of PFPI in BP control. The three main components (communication, decision-making, and reciprocity with family dyad) in SCM were committed to building an effective patient-family carer (dyadic) partnership in daily hypertension care. The conflicting beliefs, difficulty in talking about an emotional topic, and lack of skills in handling conflict negatively affected the care partnership [15, 16]. PFPI provided dyadic communication skill training improving dyadic communication led to reductions in depressive symptoms for the patients and/or family carers and a positive value for the family. Systematic reviews demonstrated that family-dyadic partnership-/relationship-focused interventions were more likely to lead to reductions in depressive symptoms for patients with chronic illness and their family carers than the family interventions only directed at increasing knowledge and skills for managing the disease [47]. The exchange of values and prefers about self-management strategies between the dyad

TABLE 5: Generalised estimating models for comparing the outcomes across time between the intervention and control groups.

Outcomes	Group effect		Time effect		Group × time effect			Pairwise contrast test					
	β	(95% CI)	p	β	(95% CI)	p	β	(95% CI)	Wald χ^2	p	MD(95% CI)	p	
<i>People with hypertension</i>													
SBP	-2.06	(-4.78, 0.66)	<0.001***	-4.68	(-6.90, -2.46)	<0.001***	-8.01	(-11.30, -4.71)	25.98	<0.001***	-8.92	(-13.22, -4.62)	<0.001***
DBP	-1.51	(-5.81, 2.79)	0.07	-2.08	(-3.52, -0.65)	<0.001***	-3.15	(-5.12, -1.18)	20.52	<0.001***	-4.84	(-8.65, -1.03)	0.01*
Proportion of people with normal BP	1.59	(0.61, 4.10)	0.04*	1.02	(0.59, 1.76)	0.02*	2.38	(1.09, 5.20)	4.70	0.03*	0.07	(-0.08, 0.23)	0.36
DRS-C-PT	0.44	(-0.81, 1.68)	0.04*	0.13	(-0.24, 0.49)	<0.001***	-2.77	(-3.33, -2.21)	109.30	<0.001***	-1.72	(-2.89, -0.55)	0.004**
HBP SCP- behaviour	-0.02	(-2.99, 0.95)	0.02*	1.30	(0.60, 2.00)	<0.001***	4.91	(3.94, 5.87)	138.07	<0.001***	4.30	(2.13, 6.46)	<0.001***
HBP SCP- self-efficacy	-0.51	(-2.70, 1.79)	0.20	0.88	(0.01, 1.75)	<0.001***	3.24	(2.01, 4.47)	29.78	<0.001***	2.21	(-0.12, 4.54)	0.06
Antihypertensive drug-titration rate	0.95	(0.45, 1.99)	0.34	1.42	(1.04, 1.92)	<0.001***	1.90	(1.02, 3.53)	5.50	0.06	0.13	(-0.05, 0.31)	0.17
Hypertensive drug-titration rate	1.43	(0.42, 4.87)	<0.001***	0.58	(0.12, 2.69)	0.53	7.00	(1.11, 44.22)	4.96	0.08	0.27	(0.08, 0.46)	0.01*
PHQ-9	-0.01	(-0.08, 0.06)	0.25	-0.01	(-0.04, 0.01)	<0.001***	-0.04	(-0.08, -0.01)	6.70	0.04*	-0.04	(-0.10, 0.02)	0.21
GAD-7	-0.03	(-0.09, 0.03)	0.03*	-0.02	(-0.04, -0.01)	<0.001***	-0.04	(-0.08, -0.01)	6.84	0.03*	-0.07	(-0.11, -0.02)	0.01*
EQ-5D-5L index score	0.01	(-0.02, 0.03)	0.05	0.01	(0.00, 0.02)	<0.001***	0.02	(0.00, 0.04)	18.76	<0.001***	0.03	(0.01, 0.06)	0.003*
EQ-VAS	1.98	(-1.32, 5.28)	0.01**	1.34	(0.19, 2.48)	<0.001***	3.03	(1.45, 4.61)	20.89	<0.001***	5.20	(2.34, 8.06)	<0.001***
<i>Family carers</i>													
GRS-C-CG	0.26	(-1.49, 2.00)	0.23	-1.14	(-1.59, -0.68)	<0.001***	-1.84	(-2.58, -1.10)	34.16	<0.001***	-1.61	(-3.17, -0.06)	0.04*
PHQ-9	-0.04	(-0.58, 0.50)	0.31	-0.26	(-0.56, 0.04)	<0.001***	-0.37	(-0.72, -0.01)	4.10	0.13	-0.27	(-0.75, 0.20)	0.26
GAD-7	0.18	(-0.37, 0.74)	0.37	-0.23	(-0.48, 0.02)	<0.001***	-0.47	(-0.80, -0.14)	15.69	<0.001***	-0.48	(-0.88, -0.07)	0.02*
EQ-5D-5L index score	0.00	(-0.02, 0.02)	0.11	-0.00	(-0.01, 0.01)	0.05	0.02	(0.01, 0.04)	7.25	0.03*	0.02	(0.00, 0.04)	0.03*
EQ-VAS	0.04	(-3.14, 3.21)	0.23	1.55	(0.44, 2.66)	0.001**	2.11	(0.48, 3.73)	15.22	<0.001***	2.90	(0.18, 5.63)	0.04*

Note. DRS-C-PT, Chinese version of Dyadic Relationship Scale (patient version); DRS-C-PT, Chinese version of Dyadic Relationship Scale (caregiver version); HBP SCP-Behaviour, Behaviour scale of Hypertension Self-Care Profile; HBP SCP-self-efficacy, Self-efficacy of Hypertension Self-Care Profile; PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalised Anxiety Disorder Scale-7; EQ-5D-5L, EuroQol five-dimensional-five-level; EQ-VAS, EuroQol Visual Analogue scale. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

members is the basis of decision-making and action in hypertension care; it could improve the self-care (e.g., medication intake and problem behaviour change) of patients with hypertension [50]. Implementing the action plan with mutual support is highly emphasised in the SCM and PFPI [28]. In the PFPI sessions, the family dyad was guided to identify problem behaviour and set goals; discuss the influence of behaviour change; discuss difficulties in behaviour changes and effective coping strategies; identify ways to seek information, professional help, and community support whenever needed; and formulate an action plan. The family dyad applied these decision-making techniques in daily hypertension care situations when needed to make decisions. Research has demonstrated that the improved decision-making skill of stroke survivor-caregiver dyad was positively associated with survivors' depressive symptoms, dyadic relationship, and survivor coping skills [51]. Dyadic partnership is also a process of giving and accepting physical and emotional help with appreciation [52]. For example, in the PFPI sessions, the family dyads discussed the assistance provided by the family carer and received by the patient in behaviour modification. They also discussed the difficulties and challenges throughout the process of giving and receiving assistance and the strategies to overcome them and express gratitude and appreciation. These reciprocity skills facilitate the family dyad's mutual cooperation in BP monitoring, medication adherence, and behaviour change at home.

Another feature of PFPI is cultural sensitivity. Interventions taking the culture into account are more likely to lead to more positive behavioural changes [53]. In the rural areas of China, family culture and values highly emphasise the responsibilities and obligations of family members in caring for sick family members [10]. Therefore, in PFPI, the family carer was treated as a partner in hypertension care. Each family dyad worked together to promote treatment adherence and lifestyle modification through effective dyadic communication (to avoid conflicts and over-protection) and decision-making in health care.

4.1.2. Dyadic-Relationship Quality. In this study, the dyadic relationship significantly improved for the intervention group at T1 ($p = 0.004$) and T2 ($p < 0.001$) with medium effect sizes (Cohen's $d = 0.52$ and 0.65 , respectively). As the dyadic relationship quality was seldom measured as an outcome in previous studies [47], limited information about the effect of interventions on dyadic relationship quality among people with hypertension could be found. Seber and Woda [28] developed a shared care dyadic intervention based on SCM for patients with heart failure and used a dyadic relationship measure as one of the patient outcomes in their pilot study. However, noticeable differences were found in the participants, sample size, study design, and times of outcome measurements between two studies, which may have led to the difference in their effect sizes on the dyadic relationship quality, with a Cohen's d of 0.65 at three-month postintervention in the current study and 0.25 immediately postintervention in Seber and Woda's study [28].

In an RCT study, a family partnership intervention was effective in improving perceived confidence and motivation for self-care and reducing dietary sodium among heart failure patients. Other RCT study also demonstrated the effectiveness of family-focused dyadic psychoeducational intervention on the dyadic relationship of stroke survivors and their family caregivers [51]. Therefore, family-dyad partnership intervention may be feasible and effective in improving self-care and self-efficacy for patients with chronic illnesses.

4.1.3. Self-Care and Self-Efficacy. PFPI significantly improved hypertensive people's self-care and self-efficacy in hypertension management with medium and small effects, respectively (Cohen's $d = 0.65$ and 0.31 , respectively). In our previous systematic review [22], three studies reported the results of self-care, all of which revealed statistically significant improvements. Similar to this study, educating family dyad jointly in the educational sessions on knowledge and skills of lifestyle modifications through discussion and goal setting and encouraging family carers to supervise patients' behavioural changes were used in previous studies. These intervention components/contents were also demonstrated (in a systematic review) to be effective in improving self-management for patients with uncontrolled type II diabetes mellitus [54]. PFPI also adopted participatory learning strategies to improve the family dyads' skill in identifying the problem behaviour and making decisions and action plans for behaviour change. The participatory learning strategies encourage more active involvement of participants in the learning process, improve the dyadic communication and cooperative techniques of family dyad in health care, and facilitate changes in their lifestyle behaviour [55].

4.1.4. Antihypertensive Drug-Treatment Rate and Antihypertensive Drug-Titration Rate. In the current study, the hypertensive people in the intervention and control groups had improved antihypertensive drug-treatment rates. However, the difference between groups was nonsignificant ($p = 0.17$ and 0.18 , respectively) at T1 and T2. In the home visit service (usual care), the village doctor monitored the BP of people with hypertension (every three months) and encouraged them to intake hypertensive drugs for those who had uncontrolled BP, which may lead to an improvement in antihypertensive drug treatment [56]. On the other hand, people with hypertension in the intervention group had significantly improved antihypertensive drug-titration rate at T1 and T2 ($p = 0.01$ and <0.001 , respectively). Although usual care (with or without PFPI) revealed effect on improving antihypertensive drug-treatment rate, the PFPI together with usual care for the intervention group had a much better effect on the antihypertensive drug-titration rate.

Evaluating the efficacy of antihypertensive drugs in BP control (e.g., BP monitoring) promptly is a prerequisite for drug titration [34]. However, only 24.5% to 34.3% of people with hypertension living in China rural communities

conducted weekly BP measurements [57]. People with hypertension receiving the PFPI had more frequent BP monitoring (e.g., measured BP at each session) than those in the usual care group, which may lead to a higher antihypertensive drug-titration rate. A recent systematic review examined the effects of family involvement in hypertension care on managing medications of older patients with chronic illnesses [56]. The findings indicated that family carers' participation in conveying information about patients' medication adherence and BP values to healthcare providers and receiving feedback and decision-making in managing medications could lead to drug titration more effectively. The intervention combining BP self-monitoring and self-titration to adjust antihypertensive medication could lead to the reduction of 9.2 mmHg in SBP and 3.4 mmHg in DBP for people with hypertension compared with the usual care group [58]. In the current study, we did not collect the data on dose and types of antihypertensive drugs, and the BP values changed after the drug titration. Therefore, the effect of drug titration on BP change remains unknown. Further studies should collect the data of doses and types of antihypertensive drugs used and changed over time, and the BP values changed after the drug titration, to identify the trajectory of BP change.

4.1.5. Depression and Anxiety Symptoms. The findings of this study revealed that PFPI reduced depressive symptoms, but the effect was nonsignificant between groups. However, anxiety symptoms were significantly reduced at T1 and T2 compared with the control group, with medium and small effect sizes (Cohen's $d=0.52$ and 0.48 , respectively). Inconsistent with the findings on depressive symptoms of hypertensive people in the current study, systematic reviews in chronic illness care have provided evidence of the positive effects of family involvement in illness management programs for adults with different chronic illnesses (e.g., stroke survivors and patients with cancer) [59, 60]. The inconsistency may be due to the low level of people's depression at baseline (mean PHQ-9 score was 4.00), where a PHQ-9 score below 10 is considered to be mild in depression symptoms. Such flooring effect of low depressive symptoms at baseline might cause difficulty in showing treatment effects by making statistically significant changes or improvements in their scores. Patients with serious illnesses (e.g., stroke and cancer) often experience more depressive symptoms [47]. The effect of PFPI on reducing hypertensive people's depressive symptoms should be further studied.

Increasing evidence of the association between anxiety and hypertension exists [61, 62], and anxiety could negatively affect medication adherence [63]. A significant correlation between anxiety, family function, and QoL was found, and anxiety had a partial mediating effect on the relationship between family function and QoL of older adults with hypertension in low-income communities [64]. The effects of family involvement in hypertension care on anxiety could not be found in previous studies. In other chronic illnesses, such as heart diseases, the effect of family dyad intervention on anxiety in patients with coronary heart

disease and family partners was evaluated in a systematic review; the authors could not find significantly lower anxiety levels for patients who received interventions focusing on disease counselling and improving social support than the control group [65]. By contrast, another systematic review demonstrated that interventions targeting the relationship between patients with cancer and their family carers could significantly improve anxiety, depression, and/or distress in both [59]. The potentially effective components of these included studies were education and training about disease knowledge, problem-solving skills, and counselling and discussions in a dyadic manner, similar to the PFPI in the current study. Therefore, even though the evidence of family-dyadic partnership interventions on anxiety symptoms of hypertension and other chronic illnesses (e.g., hypertension, diabetes, and stroke) was limited, the findings of this study supported that family-dyadic partnership intervention could be a promising intervention in improving the anxiety symptoms of people with chronic illness.

4.1.6. Health-Related Quality of Life, HRQoL. PFPI significantly improved the HRQoL of people with hypertension at T1 and T2, with medium and small effects (measured by EQ-5D-5L index: Cohen's $d=0.66$ and 0.49 , respectively; measured by EQ-VAS: Cohen's $d=0.61$ and 0.51 , respectively). An effective family-dyadic partnership was beneficial for QoL of people with hypertension in low-income communities [64]. The structure of SCM also supports a positive relationship between self-care, dyadic relationship, and HRQoL [24]. Similarly, Reid et al. reviewed [63] psychological interventions for patients with coronary heart disease, and their partners demonstrated improvements in the HRQoL of patients at 6 to 13 months post-intervention. The main components of the interventions in the reviewed studies were similar to those in this study, including information giving and counselling in 2 to 8 dyadic sessions within 1.5 to 4 months.

4.2. Effects on the Outcomes of Family Carers

4.2.1. Dyadic Relationship Quality. With no available evidence for the family's perceived dyadic relationship in hypertension care, the GEE test identified statistically significant interaction effects of PFPI on the family carers' perceived dyadic relationship at T1 ($p=0.04$) and T2 ($p=0.049$) with small effect sizes (Cohen's $d=0.36$ and 0.31 , respectively). In two pilot studies (with small sample sizes of four and 10 only), shared care interventions developed based on SCM were tested among patients with heart failure and their family carers. These studies reported improvements in the quality of dyadic relationship (also measured by DRS-CG) immediately post-intervention [27, 28]. Dyadic communication and reciprocity in healthcare were the main contents of PFPI in the current study, leading to significant improvements in dyadic relationship. Family-dyadic partnership-focused intervention had positive effects on improving the dyadic relationships in their verbal feedback, such as knowing each other better, expressing suggestions and assistance positively, exchanging

views on illness experiences, and clarifying perceptions [50]. The findings could support further research to employ the patient-family (carer) partnership model of intervention to improve the dyadic relationship of family carers and patients with hypertension.

4.2.2. Depressive and Anxiety Symptoms. The PFPI has positively improved the family carers' depressive symptoms, but the GEE test results did not indicate statistically significant effect between groups. None of the studies reviewed in our previous systematic review provided evidence about the family carers' depressive symptoms in hypertension care. The result of a systematic review and meta-analysis demonstrated that a stronger perception of filial obligation was associated with increased depressive symptoms among family carers, especially in Chinese culture [66]. Family dyadic relationship-focused interventions can significantly improve family carers' depression of patients with stroke, cancer, and arthritis [59]. Since patient and family carer depression influences patient self-care and family carer's contribution to self-care, healthcare providers should assess and treat depression in both members of the dyad to improve self-care [67]. However, caring for seriously ill patients (e.g., stroke and cancer) can bring more caregiving burden and pressure to family care. As discussed above, the low level of family carers' depression at baseline might cause difficulty in showing treatment effects by making statistically significant changes or improvements.

In the current study, family carers' anxiety symptoms were significantly improved at T2, with a small effect size (Cohen's $d=0.28$). The improved dyadic partnership is conducive to lowering anxiety symptoms, as declared in SCM [24]. No information on anxiety symptoms of family carers for people with hypertension could be obtained from previous studies. The positive effect of interventions involving the family in treatment of the anxiety of family carers has been demonstrated in systematic reviews of patients with other chronic physical diseases, such as cardiovascular disease, arthritis, and diabetes [68]. An "umbrella" review also found that dyadic relationship-focused family interventions could improve the mental health of adult patients with chronic illness and their family carers [47]. Therefore, family-dyadic partnership/relationship intervention may positively affect the family carers' anxiety symptoms, and further research is needed to support the positive effect of PFPI in improving the anxiety symptoms of family carers in hypertension care.

4.2.3. Health-Related Quality of Life (HRQoL). PFPI significantly improved the HRQoL of family carers at T1 and T2 ($p = 0.03$ and 0.02 , respectively), with small effects when measured using EQ-5D-5L index (both Cohen's $d=0.44$). However, the difference in HRQoL measured using EQ-VAS was statistically significant at T1 only ($p = 0.04$) with a small effect size (Cohen's $d=0.33$). The symptoms, mood, knowledge, and behaviour of people with hypertension towards hypertension management and the family carers' caregiving burden were significantly related to the HRQoL

of the family carer [69]. The results of a systematic review and meta-analysis that showed lower poststroke cognitive performance were associated with poorer caregivers' quality of life [68]. In the current study, with the positive effects of PFPI in improving patients' self-care, anxiety symptoms, and family carers' perceived dyadic relationship, the improvement of HRQoL could also be statistically significant and positive. Similar to other family outcomes used in this study, limited evidence was available in previous hypertension care studies. Further research is suggested to confirm the effect of PFPI on improving the carer's HRQoL.

4.3. Limitations. Several limitations should be acknowledged. First, the participants in this study were recruited in only two villages in Hunan Province in Southern China, thus limiting the representativeness of the participants and the generalisability of this study to other rural areas in China. Second, this study examined the short-term (one- and three-month postintervention) effects of PFPI on the outcome variables of people with hypertension and their family carers. The longer-term (e.g., six months or above) effects of PFPI on these outcomes remain unknown, and they need to be tested in further studies. Third, although a checklist of all items of the intervention protocol was used to monitor the intervention fidelity by the researcher during each session, this study lacked sufficient process evaluation. Future studies are recommended to adopt a process evaluation to thoroughly understand the intervention implementation, compliance of participants, and successful features of the programme [70]. An independent observer or audio and video recording could be used to measure implementation fidelity. Lastly, as an individual's BP values could fluctuate throughout the day, the BP values obtained from measuring at a one time point on the data collection day may not comprehensively reflect the patient's BP controls. A 24-hour ambulatory blood pressure monitoring could be adopted in future research to obtain more accurate BP values.

4.4. Implications. This study provides evidence on integrating the PFPI into hypertension management programmes for rural communities in China. This study also reveals its potential application to a wider hypertensive population in the rural and urban areas of China. Several suggestions were provided to facilitate the implementation of PFPI in practice. First, the study findings could help health policymakers and government administrators realise the importance of patient-family (carer) partnership as the model of intervention in hypertension management in communities, particularly in rural areas with very limited healthcare service. They could also promote the related health regulations or policies to emphasise the adoption of patient-family partnership models of care in community-based hypertension management or services. Second, hypertension care stakeholders need to discuss the barriers and facilitators of integrating PFPI into the current hypertension management service. Third, the village doctors and/or social workers, who are the common healthcare workers in rural areas, should be trained to conduct PFPI.

5. Conclusion

We evaluated the effectiveness of PFPI on people with hypertension and their family carers in rural communities in China. The findings demonstrated statistically significant positive effects of PFPI on the majority of the outcomes of participants. These findings supported integrating PFPI into the current hypertension care programmes/services as it could be a more feasible and effective approach to hypertension management in rural areas of China. Further studies are recommended to apply a mixed-method research design and recruit participants with diverse clinical, sociodemographic, and ethnic backgrounds to evaluate the longer-term effects of PFPI in different China regions.

Data Availability

The datasets used to support the findings of this study are available from the corresponding author upon request.

Additional Points

Reporting Method. The study is reported in line with the Consolidated Standards of Reporting Trials 2010 Statement. Patient or Public Contribution. Eligible hypertensive people receiving home visits and care at two village clinics and their family carers were randomly enrolled in this study. The researcher reviewed the hypertensive people's medical records in the two village clinics under study and created a list of potential participants (those aged 18 years or above and having essential hypertension without adequate BP control) in alphabetical order of their family names after screening. The people on the list were randomly selected using a random number table and approached by the researcher during home visits to further confirm the study eligibility (living with one or more adult family members, speaking Mandarin or local dialect, and without terminal and mental illness, etc.). The researcher introduced the study to the participants and the benefits, risks, participants' rights, and confidentiality when participating in this study. Written informed consent was obtained from the participants who agreed to participate in this study. The researcher delivered the intervention to participants in the intervention group. A retired village doctor was trained to collect data. What Does this Paper Contribute to the Wider Global Clinical Community? (i) The patient-family (carer) partnership intervention has the potential to improve hypertensive people's BP control in rural areas. (ii) The intervention also helps to improve hypertensive people's and family carer's dyadic-relationship quality and mental health at short-to-medium-term follow-ups. (iii) This study provides evidence on integrating the patient-family (carer) partnership intervention into hypertension management programmes for rural communities worldwide. Trial Registration. This study was registered in the Chinese Clinical Trial Registry <https://www.chictr.org.cn> (registration number: ChiCTR1900027087) in October 2019, and the first participant was recruited in July 2020.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Supplementary material 1: a checklist of intervention fidelity. The checklist consisted of all items of the intervention protocol. It was used by the researcher during each intervention session to monitor the intervention fidelity. At the end of each session, the researcher checked the completion of each item on the list with family dyad and marked as "completed" or "uncompleted." The "uncompleted" intervention item was made up in time. Supplementary material 2: hypertension management booklet. The booklet comprised four sections, including the goal of BP control, risk assessment for cardiovascular disease, criteria of healthy behaviours and worksheets for identifying behavioural problems, and hypertension self-care. (*Supplementary Materials*)

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Research Article

Effectiveness of a Structured Disaster Management Training Program on Nurses' Disaster Readiness for Response to Emergencies and Disasters: A Randomized Controlled Trial

Chia-Huei Lin ¹, Wen-Chii Tzeng ¹, Li-Chi Chiang,¹ Min-Chin Lu,² Meei-Shyuan Lee,³ and Shang-Lin Chiang ⁴

¹School of Nursing & Graduated Institute of Medical Sciences, National Defense Medical Centre, Taipei, Taiwan

²Department of Nursing, Tri-Service General Hospital, Taipei, Taiwan

³School of Public Health, National Defense Medical Centre, Taipei, Taiwan

⁴Department of Physical Medicine and Rehabilitation, Tri-Service General Hospital, School of Medicine, National Defense Medical Center, Taipei, Taiwan

Correspondence should be addressed to Shang-Lin Chiang; andyyy520@yahoo.com.tw

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Background. Most frontline nurses lack sufficient readiness for effective disaster response. Therefore, designing a disaster management training program (DMTP) to promote nurses' readiness for disaster response is imperative. **Aim.** This study aimed to evaluate the effectiveness of a structured DMTP on nurses' readiness for response to disasters. **Methods.** A randomized controlled trial was conducted. One hundred eligible nurses, recruited using convenience sampling from a medical centre in northern Taiwan, were randomly assigned to either the experimental (EG, $n = 50$) or control (CG, $n = 50$) group. Both groups received regular continuous nursing education. The EG received an extra two-day (16 h) structured DMTP delivered by transdisciplinary collaborations through multiple teaching strategies (lectures, simulations, problem-solving lessons, demonstrations, tabletop exercises, discussions, group presentations, and reflections). Readiness for disaster response, consisting of four subscales (emergency response, clinical management, self-protection, and personal preparation), was assessed at baseline and 12 weeks after the intervention. Generalized estimating equations were used as the primary method of data analyses to evaluate the intervention effects. **Results.** Ninety-four nurses (94%) completed the study, and 100 nurses were included in the intention-to-treat analysis. While participants in the EG had increased readiness for disaster response after training and at the 12-week follow-up, those in the CG exhibited no differences between baseline and 12-week follow-up. When the group \times time interaction was examined, the EG had a greater increase in readiness for disaster response and its four domains, including emergency response, clinical management, self-protection, and personal preparedness after 12 weeks, than the CG. **Conclusion.** A two-day structured DMTP utilizing multiple teaching strategies through transdisciplinary collaborations is recommended to enhance hospital nurses' readiness for disaster response. **Implications for Nursing Management.** Nursing leaders should consider incorporating such a structured DMTP into ongoing nursing training as a critical component of professional development programs, thereby strengthening nurses' disaster readiness in hospital settings.

1. Introduction

Disasters have engendered significant repercussions characterized by extensive damage, destruction, and loss of life, property, or livelihoods in communities and societies [1]. Worldwide, nations face potential threats from a wide array of disasters, including natural disasters such as earthquakes,

hurricanes, floods, landslides, and wildfires, and anthropogenic catastrophes such as terrorist attacks and warfare. These disasters have profound impacts on both individuals and nations, leading to severe consequences [2, 3].

Taiwan, situated in a geographically vulnerable region, faces a wide spectrum of natural disasters and associated hazards. Among these, earthquakes, typhoons, landslides,

floods, and industrial accidents have historically affected island nations. Over the past few decades, earthquakes have been one of the most devastating events in Taiwan. Previous disaster epidemiology studies related to the 1999 Chi-Chi earthquake in Taiwan, which claimed 2,415 lives and caused injuries to 11,305 people, revealed that the demand for medical care peaked 12 hours after the earthquake and remained elevated for up to three days [4]. These findings highlight the critical significance of timely disaster response for healthcare in Taiwan.

Disasters can result in a range of adverse outcomes, including infrastructure damage, economic consequences, physical injuries, psychosocial impacts, environmental ramifications, and deprivation of essential services such as water, sanitation, and healthcare, forcing people to leave their homes and communities temporarily or permanently and even lose their lives [3, 5]. Therefore, efforts to decrease the unexpected consequences of disasters and develop strategies to mitigate their impacts remain an imperative research focus. However, to minimize the impact of a disaster and ensure timely and effective responses, a robust frontline medical workforce, particularly nurses, is crucial in disaster areas and local hospitals near the affected sites [6, 7]. Frontline nurses must efficiently assess the severity of patients' injuries and prioritize care based on the level of urgency during a disaster when there may be a high volume of patients in need of care. In addition, nurses are responsible for stabilizing patients experiencing a medical emergency with initial treatment, transferring patients to hospitals or medical facilities, offering coordinated care to patients with other healthcare professionals, and providing emotional and psychological support to patients and their families during disasters [8].

Considering the continuous occurrence of disasters and the negative impacts they entail, nurses' readiness to respond is crucial for mitigating the adverse consequences on affected individuals. Recently, the COVID-19 pandemic has highlighted the necessity of having a national nursing workforce prepared with the knowledge, skills, and abilities to respond [9]. Disaster management is the effort to reduce unexpected consequences and disaster risks [10]. Therefore, to ensure effective and efficient disaster management, it is crucial to enhance frontline nurses' readiness for disaster response, thereby saving lives and mitigating adverse health impacts on affected populations [10, 11].

According to the World Health Organization, most disaster-related deaths occur in healthcare facilities that are unprepared for emergency situations [12]. Adequate preparation and disaster readiness of healthcare personnel, especially nurses who often serve as first responders, can significantly reduce fatalities [8, 13]. Moreover, building resilient health systems through better-prepared medical staff is fundamental [8, 11]. The readiness of nurses not only impacts the immediate effectiveness of disaster response but also significantly affects the overall resilience of health systems and predicts the nurses' willingness to engage in these situations [7] and their capacity to deliver adequate care within a disaster environment [14]. Comprising the largest segment of the healthcare workforce, nurses play

a pivotal role in shaping community health outcomes during disasters [15] and managing emergency or disaster medical situations, thereby forming the backbone of the health system. Therefore, it is crucial that nurses possess the requisite knowledge, skills, and competencies, especially readiness, to respond effectively to disasters [16].

However, a significant concern is that many hospital nurses report a lack of readiness for disaster response [15, 17]. Disaster readiness varies significantly across countries, influenced by factors such as economic status, governance, infrastructure, and historical disaster experience [18–21]. For instance, high-income countries like Finland exhibit a proactive approach by incorporating a disaster readiness mindset into governmental strategies [21]. This approach involves identifying potential disaster risks and implementing measures to mitigate them effectively, ensuring a well-coordinated response when disasters occur [21]. In contrast, many countries face challenges in disaster preparedness due to limited resources and infrastructure. Previous studies have highlighted that nurses, especially undergraduate nursing students in these regions, often lack sufficient training and education in disaster management, which is crucial for effective emergency response and clinical management [18, 20, 22]. This gap is evident in regions such as Southeast Asia and parts of Africa, where the frequency of natural disasters like floods and cyclones is high, yet preparedness levels remain inadequate [20, 22]. In Taiwan, a cross-sectional study involving 311 registered nurses at a military hospital found that the majority of nurses demonstrated poor readiness and lacked adequate preparation for disaster situations [11]. Studies have also highlighted that nurses and nursing students with prior disaster-related training and experience in disaster response demonstrate higher readiness and competencies [11, 18]. In India, nurses display moderate levels of preparedness, influenced by various factors such as education, prior disaster experience, mental health, and especially disaster self-efficacy, a vital factor that determines an individual's behavior and performance during disaster situations [23]. In Japan, nurses' disaster readiness has been significantly shaped by the country's frequent exposure to natural disasters. A study examining the disaster preparedness of nurses following the Great East Japan Earthquake found that while they demonstrated moderate levels of overall preparedness, there were notable deficiencies in handling specialized scenarios, such as chemical or biological incidents, and in their psychological preparedness [14]. Thus, the availability and quality of emergency and disaster management training for health professionals vary widely, with many countries offering little to no formal training [14]. Therefore, it is essential to develop structured and effective educational programs to enhance hospital nurses' readiness for disaster response [17].

Disasters also have significant adverse effects on the mental well-being of frontline nurses, who are a high-risk and vulnerable group of medical responders to adverse psychological outcomes [13]. In the context of surging demand, providing high-quality care during disasters is a daunting task. Such situations detrimentally affect the

health of healthcare professionals, especially their psychological well-being, owing to the repetitive exposure to traumatic events inherent in their work. Adapting preventive interventions and mitigation strategies targeted specifically at high-risk hospital nurses would be beneficial in decreasing negative outcomes [13]. The lack of adequate training for healthcare providers is a risk factor for adverse psychological health outcomes after disasters [24]. Therefore, designing and incorporating a well-structured disaster management training program into continuous clinical nursing education can mitigate the negative impacts on the mental well-being of hospital nurses who experience disaster events.

Curricula related to disaster training using multidisciplinary methods of simulation and human factor training have been proposed for implementation by organizations such as the Association of American Medical Colleges in the USA, the Government of the Federal Republic of Germany, and the Research Centre in Emergency and Disaster Medicine and Computer Science Applied to Medical Practice in Italy [17]. However, it is currently recognized that there is brief or nonexistent exposure to disaster training within current clinical training curricula worldwide, which may leave hospital nurses unprepared for an intimidating and unfamiliar setting if assisted in the healthcare workforce. Given that various nursing programs have provided education and training in disaster management in recent decades [17, 25–27], most research has focused on nursing students, and most frontline nurses have also reported insufficient readiness or preparedness in responding effectively to disasters [15, 28]. According to a recent study conducted in Greece that evaluated the effects of disaster education on hospital nurses' knowledge, skills, and expertise through evidence-based interventions, the educational intervention resulted in improved knowledge and self-confidence levels among nurses but did not lead to changes in their behavioral intentions [27]. In addition, most existing disaster programs focus on triage skills during disaster response instead of addressing the full spectrum of disaster management, including preparedness, clinical management, emergency response, and self-protection [11, 17]. Tzeng et al. delineated four critical domains of nurses' readiness for disaster response: emergency response, self-protection, clinical management, and personal preparation [11]. These domains align with the International Council of Nurses (ICN) Core Competencies in Disaster Nursing, outlined in 2019, which emphasizes the necessity for nurses to possess both theoretical and practical understanding of disaster preparedness to respond effectively to emergencies [29]. Emergency response entails managing large-scale emergencies through triage, initial stabilization of patients, incident management, medical evacuation, and transportation [8, 11, 19]. Self-protection focuses on the use of protective clothing; handling chemical, biological, radiological, and nuclear decontamination; infection control; and ensuring safety of both patients and nurses [8, 11, 17, 19]. Clinical management involves performing physical assessments, operating equipment in austere environments, and providing specific medical care such as trauma care, management of burn or

explosion injuries, first aid, and handling toxic substance injuries [8, 11, 19]. Personal preparation includes acquiring basic survival skills; making physical, psychological, and social plans (law/ethics) prior to engaging in disaster response; communication; recovery; and fostering confidence in collaboration with multidisciplinary teams or peer care [8, 11, 19].

Designing educational programs to enhance frontline nurses' disaster readiness without considering the above key domains of disaster management may not only result in the depletion of manpower and material resources but also fail to achieve the expected outcomes. Given that the ICN's core competencies in disaster nursing and the disaster readiness for response to emergencies and disasters are diverse and extensive, enhancing these competencies and readiness inevitably relies on a variety of teaching strategies. In addition, improving learning effectiveness requires the development of skills across different learning dimensions [30]. Therefore, designing disaster curricula or training programs may require multidisciplinary methods and innovative strategies. However, the development of comprehensive disaster management training programs remains limited, particularly in Taiwan, a region that urgently requires a well-prepared disaster nursing workforce.

This study examined the effectiveness of a two-day structured disaster management training program with multiple teaching strategies to promote hospital nurses' readiness for disaster response. We assume that providing such a well-organized disaster management training program delivered by transdisciplinary collaboration through multiple teaching strategies may enhance nurses' readiness for disaster response, possibly increasing their willingness to respond to disasters and mitigating the negative impacts on hospital nurses' mental well-being in the face of future disaster events. Therefore, the practical purpose of this study was to achieve two outcomes: (1) to improve nurses' readiness for disaster response, enabling them to provide timely and efficient care during disasters and (2) to strengthen nurses' resilience, helping them cope with the trauma associated with disaster response, and empowering them with the skills to take on key roles in disaster management teams.

2. Materials and Methods

2.1. Study Design. A two-parallel, randomized controlled trial was conducted at a medical centre in northern Taiwan. Eligible hospital nurses were randomly assigned to either a control group (CG), which received regular continuous nursing education, or an experimental group (EG), which participated in an additional two-day (16-hour) structured disaster management training program (DMTP). The readiness for disaster response including four domains (emergency response, clinical management, self-protection, and personal preparedness) was assessed as outcome measures.

2.2. Participants. Initially, potential participants from a military medical centre in northern Taiwan, affiliated with the national government and responsible for dispatching personnel to disaster-affected areas in Taiwan or overseas,

were recruited by a research assistant. Inclusion criteria were (1) hospital nurses with at least three months' work experience at the local medical centre; (2) aged 20–65 years; (3) full-time employees; (4) able to speak and understand Mandarin; and (5) agreed to participate in the research and to be randomized to one of the two groups. The exclusion criteria were (1) trainee nurses without nursing licenses; (2) new nurses lacking signed contracts because of their inability to work independently; (3) individuals not providing direct care; and (4) those unable to complete the intervention.

Sample size estimation using G* Power (Germany, version 3.1.9) software was based on previous studies with a medium-to-small effect size of 0.15 for the outcome of the expected increase in readiness for disaster response [19, 31, 32], an alpha set at 0.05, number of measurements 2, and a power of 0.80, and each group required 45 hospital nurses [33]. Fifty estimated participants from each group were recruited to account for a 10% loss to follow-up.

2.3. Study Cohorts and Interventions. Eligible hospital nurses were randomly assigned to the EG or CG using sealed opaque envelopes following computer-generated random serial numbers by the project investigator. All recruited participants underwent monthly continuous nursing education sessions (30–60 minutes/session) in their workplace units/wards. The participants in the EG received an extra two-day structured DMTP through multiple teaching strategies, such as lectures, simulations, problem-solving lessons, demonstrations, tabletop exercises, discussions, and reflections.

Before implementing the DMTP, we assembled a team of 17 transdisciplinary professionals, including a wilderness survival expert with over 10 years of experience, three nursing specialists in disaster nursing education with more than 10 years of experience, an emergency physician with over 20 years of experience, and 12 clinical practice experts. Among the 12 clinical practice experts, six had experience as nurses supporting disaster events, while the other six were nurse leaders with expertise in emergency/critical care, involving the project investigator/corresponding author. This team held consensus meetings to discuss program content and determine effective teaching strategies for a total of 16 hours, with 2 hours/session weekly for eight weeks. The DMTP, implemented following the consensus protocol developed by the consensus/research team, was structured based on four major domains/themes—emergency response, clinical management, self-protection, and personal preparation [11]—to ensure the validity and veracity of the delivered DMTP.

The outline of the two-day (16-hour) DMTP, as presented in Table 1, included a 2-hour lecture and a 14-hour workshop. The 2-hour lecture covered the concepts of disaster nursing, special concepts of disaster, effects of disasters on health, disaster management and its stages, assessment of possible hazards and vulnerabilities, and stages of planning in disasters. The 14-hour workshop consisted of (a) emergency response: mass casualty and triage, medical evacuation, and delivery; (b) clinical

management: trauma care, burn/explosion injury management, first aid treatment, and toxic substance injury management; (c) self-protection: nuclear and biochemical pollution disposal, protective equipment—wear and remove skills—and infection control; and (d) personal preparation: water survival training and rappelling training. In addition, disaster situational responses involve determining the magnitude of a disaster event, planning disaster response, evaluating the health needs of the affected groups, establishing priorities, identifying actual and potential public health problems, determining the resources needed to respond to the needs identified, and collaborating with other professional disciplines and governmental and non-governmental agencies. Additionally, communication skills were incorporated into the workshop to achieve goals such that the participants could better understand the challenges and complexities of responding to disasters through engagement in hands-on training exercises, role-playing scenarios, and simulations [8, 11, 17].

2.4. Measures. Sociodemographic characteristics and readiness for disaster response were collected by a separate research nurse who was blinded to the group assignments. Data on sociodemographic characteristics (age, sex, marital status, and educational level), length of nursing work, position (military or civilian nurse), nursing leader (yes or no), work unit/specialty (critical care units/emergency, general/medical-surgical ward, or others such as outpatient department and operation room), previous disaster training (yes or no), and previous disaster nursing experience (yes, no, or not yet but on list) were collected using self-administered questionnaires. Participants, including head and assistant head nurses of hospitals responsible for overseeing nursing staff, coordinating patient care, and managing resources, were categorized as nursing leaders. The EG was invited to assess their readiness for disaster response at the end of the training program. Both the EG and CG completed the evaluation of readiness for disaster response at 12 weeks. Prior to the study, the tool was reviewed by a panel of experts in disaster management, including five disaster-related experts (content validity index: 0.91), to ensure content validity. A pilot test was also conducted with 10 nurses (2 males and 8 females) to assess the tool's clarity, relevance, and ease of use. Furthermore, quality checks were conducted regularly to ensure the integrity and reliability of the data throughout the study period.

2.5. Readiness for Disaster Response. Nurses' readiness for disaster response was assessed using a 40-item self-administered scale with well-established reliability and validity (acceptable convergent validity with 0.84–0.97), including four domains: emergency response (6 items), clinical management (7 items), self-protection (11 items), and personal preparedness (16 items) [11]. The internal consistency reliabilities of the entire questionnaire and its four subscales (emergency response, clinical management, self-protection, and personal preparedness) were 0.96, 0.86, 0.85, 0.88, and 0.97, respectively. Each item was scored from

TABLE 1: The disaster management training program content in the experimental group.

Content	Teaching strategy	Domain	Time
(1) Concept of disaster nursing, special concepts of disaster, and effects of disaster on health	Lecture	—	2 hr
(2) Disaster management and its stages			
(3) Assessment of possible hazards and vulnerabilities			
(4) Stages of planning in disasters			
(1) Mass casualty and triage	1st-day workshop, six concurrent sessions: lectures, simulations, and problem-solving lessons	<i>a, b</i>	3 hr. (30 min/each topic or session)
(2) First aid treatment, bone injury, and wound care			
(3) Medical evacuation and delivery/transport			
(4) Childbirth care at disaster sites			
(5) Burn/explosion injury management and fluid infusion			
(6) Management of multiple trauma care			
Emphasizing personal safety and protection measures for responders and affected individuals during disasters	Lectures and demonstrations	<i>c, d</i>	4 hr. (2 hr./each topic or session)
(1) Water survival training			
(2) Rappelling training	2nd-day workshop: lectures, simulations, problem-solving lessons, demonstrations, discussions, and reflections	<i>a, b, c</i>	3 hr. (30 min/each session)
(1) Detection/triage and treatment of nuclear, biological, and chemical contamination/pollution			
(2) Decontamination practice and treatment for nuclear, biological, and chemical substances			
(3) Protective equipment—wear and remove skills			
(4) Infection control in the disaster environment			
(5) Toxic substance injury management			
(6) Management of nuclear, biological, and chemical pollution disposal	Tabletop exercises, simulations, problem-solving skills, group presentations, group discussions, and debriefing	<i>a, b, c, d</i>	3 hr
Scenario simulation exercises: Conducting simulated emergency scenarios to provide hands-on experience in managing crises, determining the magnitude of the disaster event, planning disaster response, evaluating health needs of the affected groups, establishing priorities, identifying actual and potential public health problems, determining resources needed to respond to the needs identified, and collaborating with other professional disciplines, governmental and nongovernmental agencies, and communication skills			
Comprehensive discussions	Group discussions and reflections	—	1 hr

Note. ^aEmergency response, ^bclinical management, ^cself-protection, and ^dpersonal preparation.

1 (strongly disagree or very low readiness), 2 (disagree or low readiness), 3 (neutral or average readiness), 4 (agree or high readiness), to 5 (strongly agree or very high readiness) on a five-point Likert scale, with scores ranging from 40 to 200. Each subscale score ranged from 6 to 30, 7 to 35, 11 to 55, and 16 to 80, in emergency response, clinical management, self-protection, and personal preparedness, respectively. Higher scores represented greater readiness for disaster response. The percentage of total scores was categorized into readiness levels: a score percentage above 75% indicated "highly competent or very good," 50% to 75% indicated "moderately competent or good," 25% to 50% indicated "low competent or fair," and below 25% indicated "incompetent or poor." In addition, the Cronbach's alpha for the scale and its four subscales (personal preparedness, self-protection, emergency response, and clinical management) in this study were 0.92, 0.94, 0.90, 0.82, and 0.76, respectively.

2.6. Ethical Consideration. Approval from the institutional review board was obtained (Reference number: 2-103-05-018) from a local medical centre in Taiwan. Participation in the study was entirely voluntary, and the participants could withdraw from the study at any time.

2.7. Data Analysis. The study employed SPSS version 16.0 (SPSS Corp., Armonk, NY, USA) for all statistical analyses. Descriptive statistics including means with standard deviations (SDs) and numbers with percentages (%) were utilized to present the characteristics of the study participants. The last observation-carried-forward method of data imputation was used for the intent-to-treat analysis. Baseline characteristic comparisons between groups were conducted using the independent *t*-test or chi-square test. Differences between the groups, both pre- and postintervention, as well as the mean difference between pre- and postintervention within the two groups, were compared using independent *t*-tests. To assess the intervention effects over time, the generalized estimating equations (GEEs) analysis for longitudinal data was applied, considering the significant interaction of group and time (group \times time) [34]. All statistical analyses were two-tailed, and significance was set at $p < 0.05$.

3. Results

3.1. Baseline Characteristics of Participants. Initially, 399 hospital nurses were screened. Of these, 264 nurses declined to participate, and 35 nurses did not meet the inclusion criteria (six had not yet signed contracts with the hospital, four were trainee nurses without nursing licenses, two did not provide direct care, and 23 reported not being able to complete the study intervention). The remaining 100 participants who met the inclusion criteria were randomly assigned: 50 (50%) to the EG and 50 (50%) to the CG.

Of the 100 eligible hospital nurses, 94 (94%) completed the study. The reasons for missed visits, including withdrawal from the study due to absence on the second day of the training program ($n = 4$) and loss in follow-up due to

leaving the nursing job at the hospital ($n = 2$) at the 12-week assessment, are presented in the flow diagram (Figure 1). However, 100 participants were included in the data analysis.

The sociodemographic characteristics, working units, experience of previously received disaster training, and personal participation experience in disaster events of the EG and CG are presented in Table 2. The baseline scores of readiness for disaster response and its four subscales (emergency response, clinical management, self-protection, and personal preparedness) for the two groups are shown in Table 3.

3.2. Outcome Evaluation. Table 3 presents the descriptive and univariate analyses of the outcome evaluations. Nurses in the EG had increased readiness for disaster response and its three subscales—emergency response, self-protection, and personal preparedness—immediately after the program and at the 12-week follow-up. However, there were no significant changes in the readiness or its four subscales in the CG. The EG had a remarkably greater increase in the mean differences between pre- and postintervention in readiness for disaster response and its four subscales than the CG.

The effectiveness of the two-day DMTP on readiness for disaster response and its four subscales, including emergency response, clinical management, self-protection, and personal preparedness, assessed through GEE analyses, is shown in Table 4. The analysis revealed a significant interaction between group and time (group \times time) regarding readiness for disaster response, indicating that the EG experienced a greater increase at 12 weeks than the CG ($\beta = 27.3$, $p < 0.001$). Specifically, the EG demonstrated significant improvements in emergency response ($\beta = 3.7$, $p = 0.002$), clinical management ($\beta = 3.7$, $p = 0.012$), self-protection ($\beta = 8.4$, $p < 0.001$), and preparedness ($\beta = 10.5$, $p = 0.003$), compared to the CG.

4. Discussion

4.1. Summary of Findings. Our study demonstrates the effectiveness of a two-day, structured disaster management training program provided by transdisciplinary professionals via multiple teaching strategies in improving hospital nurses' readiness for disaster response, including four domains: emergency response, clinical management, self-protection, and personal preparedness. The program significantly enhanced hospital nurses' disaster management readiness. These findings contribute substantively to the existing literature by confirming that active participation in a structured and comprehensive disaster management training initiative can substantially bolster hospital nurses' preparedness, increasing their confidence and willingness to engage in effective disaster response [17, 35]. Moreover, our results align with previous research, emphasizing the importance of a well-structured training program delivered through collaborative efforts across disciplines and employing varied

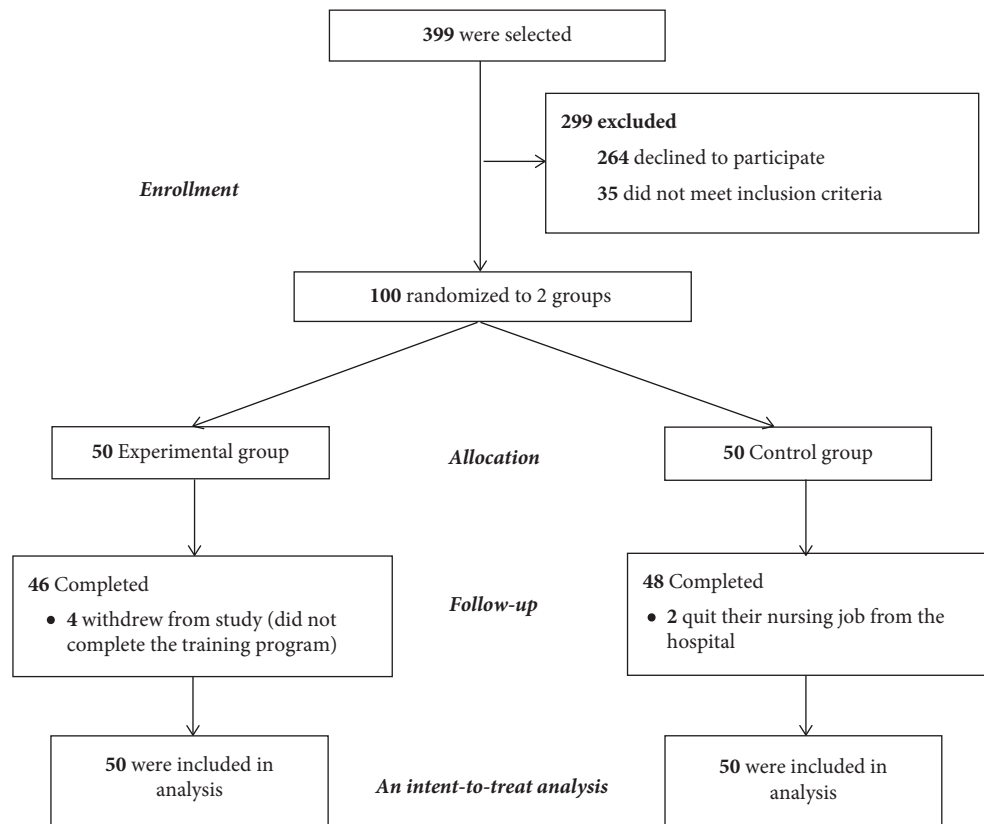


FIGURE 1: CONSORT diagram of participants' flow through the trial.

TABLE 2: Comparisons of baseline characteristics between the experimental and control groups.

Variables	Experimental group (n = 50)		Control group (n = 50)		t/x ²	p
	Mean ± SD	n (%)	Mean ± SD	n (%)		
Age (year)	35.5 ± 8.6		34.8 ± 8.1		-0.43	0.67
Length of nursing work (year)	12.6 ± 8.5		11.2 ± 8.5		-0.82	0.42
Gender					0.00	1.0
Female (n = 96)		48 (50.0)		48 (50.0)		
Male (n = 4)		2 (50.0)		2 (50.0)		
Marital status					3.28	0.35
Married (n = 45)		24 (53.3)		21 (46.7)		
Single (n = 55)		26 (47.3)		29 (52.7)		
Educational level					3.84	0.14
Associate (n = 19)		6 (31.6)		13 (68.4)		
Bachelors (n = 53)		27 (50.9)		26 (49.1)		
Masters and above (n = 28)		17 (60.7)		11 (39.3)		
Position					1.50	0.31
Military nurse (n = 40)		23 (57.5)		17 (42.5)		
Civilian nurse (n = 60)		27 (45.0)		33 (55.0)		
Nursing leader					3.66	0.09
Yes (n = 33)		21 (63.6)		12 (36.4)		
No (n = 67)		29 (43.3)		38 (56.7)		
Work unit/specialty					3.42	0.18
Critical care units/emergency (n = 39)		24 (61.5)		15 (38.5)		
General/medical-surgical ward (n = 37)		16 (43.2)		21 (56.8)		
Other (n = 24)		10 (41.7)		14 (58.3)		
Previously received disaster training					0.41	0.67
Yes (n = 33)		18 (54.5)		15 (45.5)		
No (n = 67)		32 (47.8)		35 (52.2)		

TABLE 2: Continued.

Variables	Experimental group (<i>n</i> = 50)		Control group (<i>n</i> = 50)		<i>t/x</i> ²	<i>p</i>
	Mean ± SD	<i>n</i> (%)	Mean ± SD	<i>n</i> (%)		
Previous disaster nursing experience					2.11	0.35
Yes (<i>n</i> = 8)		5 (62.5)		3 (37.5)		
Not yet (on list) (<i>n</i> = 23)		14 (60.9)		9 (39.1)		
No (<i>n</i> = 68)		31 (45.6)		37 (54.4)		

Note. The data are presented as mean ± SD or number and percentages (%). *P* values were from chi-square test or Student *t*-test, as appropriate.

teaching strategies, ultimately improving response readiness in complex disaster scenarios [17].

The effectiveness of this disaster management training program offers compelling evidence for an optimal educational approach geared towards improving nurses' readiness for disaster response, encompassing emergency response, clinical management, self-protection, and personal preparedness. In light of the steady rise in the availability of disaster training programs over the past two decades, our hypothesis was that creating a structured disaster management training program, delivered by transdisciplinary professionals utilizing multiple teaching strategies, would enhance individuals' knowledge and skills. Furthermore, as previously reported, we believe that it can also enhance their motivation to overcome perceived barriers and indecisive thinking and, most importantly, strengthen their willingness to actively participate in complex disaster situations [17, 35]. The primary focus of the program was to promote readiness for disaster response through a transdisciplinary professional-delivered approach. In addition, the utilization of diverse teaching strategies in the program served as a valuable model for evidence-based nursing education in clinical settings, specifically for hospital nurses.

4.2. Comparison with Previous Research. Our study findings highlight that transdisciplinary collaboration brings together experts from various professional fields, such as emergency management, public health, education sciences, and nursing, and ensures a holistic understanding of disasters and their impacts. This collaborative approach allows the design of a comprehensive educational training program for disaster response [17, 36]. Diverse experts foster innovative thinking and problem solving by providing various perspectives, ideas, and solutions, leading to more effective and well-rounded disaster preparedness, response, and management plans [17]. For example, during a consensus meeting before the training program, the invited experts shared diverse perspectives on the program's design. Transdisciplinary professionals collectively identified the vulnerabilities and risks associated with various types of disasters, aiding the development of targeted mitigation strategies and risk reduction measures [17]. In addition, our transdisciplinary teams analyzed resource requirements across multiple sectors and identified efficient allocation strategies, optimizing the use of limited resources and prioritizing critical needs during disasters to simulate real-world scenarios. A recent report stated that the emerging trends in disaster research

over the past 20 years, marked by increased international cooperation and the transdisciplinary nature of disaster science, have gained popularity [36]. This demonstrates that valuable lessons can be learned from catastrophes and that these emerging trends serve as a scientific foundation for a clearer understanding of progress in disaster science, providing a reference for rapidly identifying frontier issues in disaster science.

Adopting various teaching approaches such as competency-based, all-hazard, and interprofessional approaches, flipped classrooms, simulations, tabletop exercises, virtual reality, and telenursing care in simulated conditions is the current trend in the design of disaster training programs [17, 37]. Therefore, our study employed multiple teaching strategies, including lectures, simulations, problem-solving lessons, demonstrations, tabletop exercises, discussions, group presentations, and reflections, through transdisciplinary collaborations in designing the disaster management training program for hospital nurses. This program aimed to enhance learning outcomes because individuals have different learning styles and preferences. In addition, participants accommodated various learning styles and engaged in training more effectively, increasing their chances of understanding and retaining information and enhancing learning outcomes. Different teaching strategies promoted active participation and engagement among the participants. Instead of passive learning, participants were actively involved in the learning process through discussions, group activities, and practical exercises. This active engagement facilitates better comprehension, critical thinking, and knowledge application, making training more effective and impactful. In addition, given the rapidly changing nature of disasters, the effectiveness of disaster response remains uncertain, particularly due to the challenges in ensuring the timely arrival of professional rescuers. Therefore, telehealth will play an important role in disaster management. A recent study demonstrated that the quality of telenursing care under simulated conditions was satisfactory during the response phase to disasters at Kerman [37]. Therefore, implementation of telenursing care would be helpful in future disasters; however, more evidence is recommended to support the use of telenursing care training under simulated conditions as an alternative teaching strategy.

Disaster management training requires the development of practical skills such as emergency response procedures, risk assessment, communication protocols, and coordination techniques. Therefore, incorporating hands-on

TABLE 3: Comparison of readiness for disaster response between groups at baseline and 12 weeks.

	Baseline				12 weeks				M.D. between pre- and post-test			
	EG (n = 50) Mean (SD)	CG (n = 50) Mean (SD)	t	P	EG (n = 50) Mean (SD)	CG (n = 50) Mean (SD)	t	P	EG (n = 50) Mean (SD)	CG (n = 50) Mean (SD)	t	P
Readiness for disaster response	111.8 (27.9)	121.2 (25.7)	-1.48	0.14	139.8 (23.3)	122.7 (27.8)	3.34	0.001	28.5 (28.4)	1.4 (14.6)	5.94	<0.001
Emergency response	16.3 (4.9)	17.4 (3.9)	-1.20	0.23	20.1 (3.5)	17.5 (4.5)	3.23	0.002	3.8 (4.6)	0.18 (3.1)	4.67	<0.001
Clinical management	23.0 (6.1)	24.6 (5.4)	-1.41	0.16	26.6 (4.4)	24.8 (5.1)	1.91	0.06	3.8 (5.5)	0.18 (3.8)	3.87	<0.001
Self-protection	26.7 (7.9)	29.2 (7.0)	-1.68	0.10	36.2 (6.9)	30.3 (8.6)	3.78	<0.001	9.5 (8.8)	1.1 (5.3)	5.73	<0.001
Personal preparedness	47.0 (13.9)	50.1 (13.1)	-1.16	0.25	56.9 (11.2)	50.1 (13.1)	2.79	0.01	10.4 (13.9)	-0.02 (3.8)	4.91	<0.001

Note. M.D., mean difference between pre- and post-test (12 weeks); P values were from independent t-test.

TABLE 4: Evaluation of the effectiveness of nurses' readiness for disaster response based on GEE analysis.

	EG (n = 50)			CG (n = 50)			Between group			Interaction: group (EG) × time ^c		
	Mean ± SD	β	Within p ^a	Mean ± SD	β	Within p ^a	β	p ^b	SE	Lower	Upper	p
Readiness for disaster response												
Baseline	111.8 ± 27.9	—	Ref	121.2 ± 25.7	—	Ref	-10.2	0.06	7.4	12.8	41.7	<0.001
After training	145.8 ± 28.1	34.7	<0.001	—	—	—	—	—	—	—	—	—
12 weeks	139.8 ± 23.3	28.7	<0.001	122.7 ± 27.8	1.4	0.79	17.1	0.001	—	—	—	—
Emergency response												
Baseline	16.3 ± 4.9	—	Ref	17.4 ± 3.9	—	Ref	-1.1	0.23	1.2	1.3	6.0	0.002
After training	21.0 ± 4.4	4.7	<0.001	—	—	—	—	—	—	—	—	—
12 weeks	20.1 ± 3.5	3.8	<0.001	17.5 ± 4.5	0.2	0.83	2.6	0.001	—	—	—	—
Clinical management												
Baseline	22.7 ± 5.8	—	Ref	24.6 ± 5.4	—	Ref	-1.8	0.10	1.5	0.8	6.5	0.012
After training	27.1 ± 5.4	4.3	<0.001	—	—	—	—	—	—	—	—	—
12 weeks	26.6 ± 4.4	3.8	<0.001	24.8 ± 5.1	0.2	0.86	1.8	0.05	—	—	—	—
Self-protection												
Baseline	26.7 ± 7.9	—	Ref	29.2 ± 7.0	—	Ref	-2.5	0.09	2.1	4.2	12.6	<0.001
After training	38.9 ± 7.8	12.2	<0.001	—	—	—	—	—	—	—	—	—
12 weeks	56.9 ± 11.2	9.5	<0.001	30.3 ± 8.6	1.1	0.48	5.9	<0.001	—	—	—	—
Personal preparedness												
Baseline	46.4 ± 13.6	—	Ref	50.1 ± 13.1	—	Ref	-3.7	0.17	3.6	3.45	17.5	0.003
After training	58.9 ± 12.3	12.4	<0.001	—	—	—	—	—	—	—	—	—
12 weeks	56.9 ± 11.2	10.4	<0.001	50.1 ± 13.1	-0.02	0.99	6.8	0.01	—	—	—	—

Note. EG: experimental group; CG: control group; C.I., confidence interval; P values were from GEE models, with a group × time interaction term characterizing the intervention effect of interest; ^areference group: baseline; ^breference group: control group; ^creference group: group (CG) × time.

exercises, simulations, and real-life case studies provides opportunities for participants to apply their knowledge and practical skills to make decisions in realistic scenarios. This practical approach helps bridge the gap between theory and practice, building competence and confidence in hospital nurses, thus ensuring their readiness for disaster response. Therefore, using multiple teaching strategies in a disaster management training program not only enhances learning outcomes but also promotes active participation and engagement, facilitates varied perspectives, develops practical skills, improves knowledge retention, fosters collaboration, encourages adaptability, and provides a holistic understanding of the field [17, 36]. These benefits contribute to the overall effectiveness of the training program and equip hospital nurses with effective disaster management strategies.

A recent systematic review reported that, among 23 studies, the majority assessed knowledge (78.3%), attitude (60.9%), or skills (43.5%) following disaster training [35]. This highlights the need for further research on the assessment of readiness for disaster response after such training. Most of the reported disaster programs focused on triage skills during disaster response instead of addressing the full spectrum of disaster management [11, 17]. In addition, the length of disaster training programs ranged from 1 to 28 days, with a median duration of two days [35]. Therefore, we developed and evaluated the effectiveness of a two-day structured DMTP covering the full spectrum of disaster management, including emergency response, clinical management, self-protection, and personal preparedness. Overall, our study found that the DMTP improved hospital nurses' readiness for disaster response, which could be attributed to the enhancement of participants' attitudes, knowledge, and skills in disaster response [35]. In addition, most studies investigating the effectiveness of disaster training programs have used pre- and posttest measures [17]. Therefore, the strength of our study lies in the fact that we conducted a randomized controlled trial to prove the effectiveness of DMTP.

Medical responders are at a high risk of experiencing a wide range of negative psychological health conditions following a disaster. Notably, depression and posttraumatic stress disorder are the most commonly diagnosed conditions among medical responders. A recent report documented that the prevalence of posttraumatic stress disorder among medical workers involved in the earthquake response was 16.4%, highlighting that medical workers involved in responding during disasters should undergo screening for mental health disorders before and after disasters and receive the necessary training regarding stress management and psychological resilience [38]. Particularly, nurses have higher levels of adverse outcomes than physicians and other medical professionals [13]. In addition, when organizations are exposed to disasters, staff members are often unprepared for the potential psychological impacts that can negatively affect their well-being. Fortunately, predisaster training can improve employees' confidence in their ability to cope with disasters [28, 39] and contribute to improving their psychological health [40]. Furthermore, combining

reinforcement of emotional intelligence with predisaster training can also facilitate learning outcomes, since emotional intelligence has a significant positive relationship with various components of learning strategies, namely, self-efficacy, rehearsal, critical thinking, cognitive self-regulation, time and study environment management, peer learning, and help seeking [40]. Therefore, lack of structured and comprehensive training is an important risk factor for negative psychological outcomes across all types of disasters [13].

Personal preparedness and self-protection are critical for disaster response management. In challenging disaster environments, emergency services may not be readily available or may become overwhelmed. Individuals who are self-prepared and have basic self-reliance skills are more likely to survive, recover quickly, and be in a position to help others, reducing the risks of injury or death. Therefore, preparedness for self-rescue or self-protection is one of the most important elements of organized and timely emergency response to disaster events [41]. Personal preparedness and self-protection also enable swift responses in the immediate aftermath of a disaster, which is crucial for survival. Additionally, having individuals well-prepared for self-protection during a disaster can alleviate the burden on emergency services, allowing first responders to prioritize those in greatest need [11]. Therefore, personal preparedness and self-protection not only increase individuals' chances of survival and recovery but also contribute to an effective disaster response.

Readiness for disaster response, an important component of disaster management, encompasses the capacity to manage disaster impact quickly and efficiently. Therefore, responding quickly and appropriately to disasters is crucial and depends on frontline nurses' preparedness. Nurses' readiness for disaster response and competencies can vary depending on factors such as their specialty or work area of practice, individual interests, prior experience in in-service training programs, and exposure to deployments in disaster sites [18]. For example, nurses working in emergency departments or critical care settings may have more training and experience in disaster response than those working in other areas of healthcare [28]. However, nurses' readiness for disaster response includes not only clinical management and emergency response but also personal preparedness and self-protection ability [11]. During a disaster event, nurses not only provide first aid and advanced clinical care, monitor physical and mental health needs, allocate resources, conduct efficient communication, and provide crisis leadership [17] but also oversee the use of personal protective equipment, maintain personal emergency supply, prioritize their own safety, utilize appropriate personal protective equipment, and practice infection control measures to minimize exposure to hazards. In addition, according to our previous findings, nurses with prior disaster training were associated with greater readiness for disaster response, including its four major domains: emergency response, clinical management, self-protection, and personal preparedness, after adjusting for potential covariates such as sociodemographics (marital status and educational level), length of nursing

work, nursing position, nursing leaders, work unit/specialty, and previous disaster nursing experience [28]. Therefore, the current study aimed to develop a two-day structured disaster management training program that addresses the full spectrum of disaster management, including preparedness, clinical management, emergency response, and self-protection. Fortunately, we discovered the effectiveness of the training program in increasing hospital nurses' readiness for disaster response, both immediately after the program and at the 12-week follow-up.

4.3. Limitations and Strengths. There are some limitations in this study that should be considered. First, the geographic region in which this study was conducted may limit its generalizability to other cultural groups. Therefore, the current research findings must be interpreted with caution; more rigorous sampling strategies from multiple sites or hospitals are recommended. Second, although the 12-week follow-up effects after intervention are important, evaluation of long-term follow-up might be necessary. While acknowledging these limitations, it is crucial to recognize the strengths of our study as well. These strengths include the random allocation design, provision of a well-structured disaster management training program with multiple teaching strategies, and a high rate of study completion by the participants (94%).

4.4. Contributions and Future Directions. Notably, our study is the first trial to test the effectiveness of a two-day (16-hour) structured disaster management training program that includes four major domains/themes (emergency response, clinical management, self-protection, and personal preparation) through multiple teaching strategies (i.e., lectures, simulations, problem-solving lessons, demonstrations, tabletop exercises, discussions, group presentations, and reflections by transdisciplinary collaborations on readiness for disaster response among hospital nurses). Future studies could apply this training program to confirm its effectiveness across different cultures and focus on investigating competencies, combining knowledge, attitude, skills, readiness, and self-efficacy. This might help to elucidate how the training program improves readiness for disaster response in this population. Moreover, further more studies can (1) conduct longitudinal studies to provide insights into the long-term retention of disaster response skills and identify necessary intervals for refresher training; (2) integrate modern technologies like virtual simulation to potentially elevate training efficacy; (3) explore whether the program not only increases readiness for disaster response but also empowers hospital nurses; and (4) employ focus groups or qualitative methods to examine hospital nurses' perceptions regarding the most helpful aspects of the training. In addition, the feasibility of implementing the intervention in hospitals, educational institutions, and schools is an important next step.

4.5. Implications for Nursing Management. In light of our study findings, which reveal that structured disaster management training programs (DMTPs) utilizing

multiple teaching strategies and transdisciplinary collaborations significantly enhance nurses' readiness for emergency and disaster response, nursing leaders or managers should actively integrate such DMTPs into ongoing professional development curricula to fortify hospital response readiness and capabilities. Specifically, nursing leaders are encouraged to prioritize these training modules, ensuring they are recurrent and updated regularly to reflect the latest in disaster response protocols and technology. Moreover, it is recommended that these programs be tailored to the specific needs and challenges of the nursing staff within individual healthcare facilities, considering factors such as existing skill levels and potential disaster risks pertinent to geographical locations. Nursing management could also benefit from establishing a feedback loop where participants in these programs contribute insights and suggestions for improvements. This approach fosters a culture of continuous learning and adaptation, thereby improving individual nurse preparedness and enhancing the overall institutional resilience to disasters.

5. Conclusions

A two-day structured disaster management training program, delivered by transdisciplinary professionals using multiple teaching strategies, can serve as an effective approach to improve hospital nurses' readiness for disaster response. Such disaster training programs might include innovative methods such as virtual reality and be integrated into ongoing nursing education and future curricula to strengthen disaster readiness across healthcare settings. In addition, continuous educational efforts and periodic refresher training are recommended to maintain and update these critical skills. Nursing leaders or managers should consider incorporating such a structured disaster management training program as a critical component of professional development programs, thereby strengthening nurses' disaster readiness in hospital settings, fostering a culture of continuous learning and adaptation, and enhancing overall institutional resilience to disasters.

Data Availability

Data are available from the corresponding author upon reasonable request.

Disclosure

The funding organization had no role in the design, analysis, interpretation of data, writing of the manuscript, or decision to publish the results. The authors retained full independence in the conduct of this research.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Review Article

Effectiveness of Individual-Based Strategies to Reduce Nurse Burnout: An Umbrella Review

Hsiang-Chin Hsu ^{1,2,3} Huan-Fang Lee ^{4,5} Hsuan-Man Hung ⁶ Yi-Lin Chen,⁷
Miaofen Yen ⁴ Hui-Ying Chiang ⁸ Lok-Hi Chow ⁹ Susan J. Fetzer ^{4,10}
and Pei-Fan Mu ^{5,11}

¹Department of Emergency Medicine, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan

²Department of Emergency Medicine, School of Medicine, College of Medicine, National Cheng Kung University, Tainan, Taiwan

³School of Medicine, College of Medicine, National Cheng Kung University, Tainan, Taiwan

⁴Department of Nursing, College of Medicine, National Cheng Kung University, Tainan, Taiwan

⁵Taiwan Holistic Care Evidence Implementation Center: A JBI Affiliation Center, Taichung, Taiwan

⁶Department of Nursing, Fooyin University, Kaohsiung, Taiwan

⁷Nursing Department, National Cheng Kung University Hospital, College of Medicine, Tainan, Taiwan

⁸Nursing Department, Chi Mei Medical Center, Tainan, Taiwan

⁹Department of Anaesthesiology, Taipei Veterans General Hospital, Taipei, Taiwan

¹⁰Department of Nursing, College of Health and Human Services, University of New Hampshire, Durham, NH, USA

¹¹Institute of Clinical Nursing, National Yang Ming Chiao Tung University, Taipei, Taiwan

Correspondence should be addressed to Huan-Fang Lee; eamonn0330@gmail.com

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Aims. This umbrella review aims to comprehensively synthesize and analyze the findings of available systematic reviews on the effectiveness of individual-based strategies for reducing nurse burnout occurring in hospital-based settings. **Methods.** Following JBI guidelines, an umbrella review was conducted to integrate the effectiveness of various strategies to reduce burnout. Systematic reviews were searched in the Embase, MEDLINE (Ovid), Cochrane Library, CINAHL (EBSCO), Scopus, and WOS databases. Inclusion criteria included studies published in any language from database inception to April 2023. Eligibility assessment involved two independent reviewers who evaluated titles, abstracts, and full texts. The systematic reviews were critically evaluated using JBI SUMARI. The results were narratively synthesized and grouped by strategy. **Results.** Eleven systematic reviews were included, covering the years 2012 to 2021. The appraisal tools varied, though all included reviews were of high quality. The strategies were categorized into three domains: mental health (51%), physical activities (26%), and professional competence (13%). The interventions most identified were mindfulness-based stress reduction for mental health, yoga for physical activities, and professional competence education. These individual-based strategies were shown to effectively eliminate emotional exhaustion (72.7%), depersonalization (44%), and occupational stress (78%) among nurses in hospital-based settings. **Conclusion.** Mental health, physical activities, and professional competence are strategies to reduce nurse burnout. Implementing these approaches in healthcare settings can improve emotional exhaustion, depersonalization, and occupational stress of nurses.

1. Introduction

Globally, nurse burnout is a critical issue impacting on the healthcare workforce which is reported as 11.23% of burnout symptoms [1] and continuously spreading out within the healthcare sector [2].

Indeed, nurse burnout is amplified during the COVID-19 pandemic, given their increased vulnerability to the virus and the multifaceted challenges encountered in providing care [3, 4]. Nurses constitute a large proportion about 60% in hospitals, and an increasing number of nurses are required to assist critical and general patient care during the COVID-19 pandemic [5].

Burnout in nurses has numerous detrimental effects on individuals, organizations, and patient care. It significantly affects the health and well-being of nurses by emotional exhaustion, depersonalization, and low personal accomplishment. These symptoms can have adverse consequences for nurses, including the development of physical and mental health problems such as depression and anxiety [6, 7]. Nurse burnout is linked to poor outcomes such as quality of care and patient satisfaction [6]. Burnout can be detrimental to patient care quality, leading to an increase in medical errors that compromise patient safety [8]. Addressing nurse burnout becomes imperative to uphold quality patient care and sustaining the healthcare system. Improving nursing burnout requires interventions at various levels, including national and organizational policy such as creating a positive work environment and healthy workforce strategies, as well as individual-based approaches. While national and organizational strategies to reduce burnout are generally directed towards the majority, individual-based strategies are needed to be designed for nurses to choose according to their preference.

Numerous interventions have been suggested to assist nurses in practicing self-care with the aim of mitigating or preventing burnout and various individual health-related outcomes [9–13]. For example, physical activities such as yoga, Qigong, and Tai Chi have been proposed to improve sleep quality and alleviate post-shift stress [10]. Emotion-focused tactics and psychosocial programs have been implemented to enhance mental health and prevent burnout [12]. A variety of mindfulness-based interventions (MBSR) have been advocated to enhance nurse well-being. These interventions have shown positive impacts on sleep quality, anxiety, depression, and overall resilience [13–15]. Interventions such as team-based training, communication skills enhancement, cognitive coping mechanisms, and problem-solving techniques have demonstrated efficacy in reducing nurse burnout and maintaining effectiveness [9, 11]. Multicomponent interventions have also positively affected physical and mental health and job satisfaction [12].

Recent research on nursing burnout has increasingly focused on multifaceted interventions with promising potential. These interventions often combined physical or psychological methods, yet researchers are interested in wide range of outcome indicators [16, 17]. Numerous original studies employing different approaches to reduce burnout have yielded varying results due to differences in study design and implementation [17, 18]. Systemic review and

meta-analysis on the topic of burnout have emerged prominently since the 1990s and have been essential to integrate the best evidence while evaluating research biases [19]. However, differing criteria for research inclusion and exclusion, search terms, timeframes, language, and type of article have contributed to varied outcomes and interpretations on the efficacy of nurse burnout strategies. The increasing number of such reviews can be overwhelming for those seeking clinical application. Furthermore, while numerous interventions are frequently used, their comprehensive evaluation in many meta-analyses remains lacking [20].

An umbrella review, alternatively known as an overview of reviews, represents a unique literature review format that aggregates findings from multiple systematic reviews or meta-analyses on a specific subject [21]. Unlike traditional systematic reviews that examine primary studies, an umbrella review analyzes evidence from existing reviews to provide a more comprehensive overview of the research area. This method is particularly apt for a comprehensive synthesis of varied strategies and outcomes across a multitude of reviews, providing a more integrated understanding of effective interventions in a thoroughly researched domain [20, 21]. By compiling data from various reviews, an umbrella review yields clearer, more substantial, and elevated insights into the efficacy of individual-based strategies for mitigating burnout among nurses. This type of review facilitates a thorough assessment of current evidence, pinpointing both consistencies and discrepancies in the findings [22]. Therefore, the objective of this umbrella review is to comprehensively synthesize and analyze selected systematic reviews which have evaluated the effectiveness of individual strategies implemented to reduce burnout among nurses.

2. Methods

This umbrella review aims to synthesize the impact of individual-based strategies on reducing nurse burnout within hospital-based settings. The methodology adhered to the guidelines developed by the Joanna Briggs Institute [23] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting standards. The umbrella review was registered in the PROSPERO system (Number: CRD42022330618).

2.1. Search Strategy. Six databases, from inception to April 2023 were searched: Embase, MEDLINE (Ovid), Cochrane Library, CINAHL (EBSCO), Scopus, and WOS. The PICO framework guided this umbrella review with the question: Are individual-based strategies effective in reducing burnout among front-line nurses in hospital settings? Language was not restricted. The MeSH and free-text terms related to individual-related strategies for burnout in nurses were searched. The syntax was listed as [(nurse* OR (staff* OR employee* OR officer* OR personnel* OR practitioner* OR profess* OR provider* OR specialist* OR worker*)) NEAR/6 (nurs* OR health* OR hospital* OR medical))] AND

[(burnout* OR "burn out*" OR exhaustion* OR (extreme* ADJ 4 fatigue*))]. The SR filter formula used the BMJ Best Practice syntax (<https://bestpractice.bmj.com/info/toolkit/learn-ebm/study-design-search-filters/>).

2.1.1. Inclusion and Exclusion Criteria. The selection process applied the following inclusion criteria: (1) studies specifically targeting nurses, (2) interventions that were individual-based and aimed at reducing burnout, (3) primary outcomes related to burnout and their dimensions, such as emotional exhaustion, depersonalization, and reduced personal accomplishment, (4) the context as hospital-based setting, and (5) type of systematic reviews was intervention-based. Studies were excluded if (1) participant data were combined with other healthcare disciplines, (2) no provided data to address the effectiveness in the systematic reviews, and (3) insufficient information to appraising methodologic quality.

2.1.2. Selection of Articles. Articles meeting the inclusion criteria were uploaded to EndNote X9 (Clarivate Analytics, PA, USA) for article screening. Two independent reviewers assessed eligibility by titles and abstracts followed by full text review of eligible studies. Reasons for the exclusion of papers that did not meet the inclusion criteria were recorded. Any disagreements between the two reviewers were resolved through discussion with a third reviewer. After relevant studies were retrieved, the JBI system for the unified management, assessment, and review of information (JBI SUMARI) (JBI, Adelaide, Australia) was applied to integrate findings.

2.2. Quality Appraisal. The methodology's quality was evaluated using the JBI SUMARI's systematic review instruments, consisting of the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (JBI CACSRRS) [24]. The appraisal of systematic reviews or meta-analyses is guided by 11 questions. The answers are rated as "yes," "no," "unclear," "or not applicable." Two independent reviewers used the instruments to appraise eligible studies. A third reviewer was consulted to facilitate discussion and resolve any issues.

2.3. Data Extraction. The JBI SUMARI was used to extract data from the included reviews. The information extracted included first author's name and country, published year, and review objectives. The details of included studies in each review were extracted and included the number of studies, number of included participants, country, study design, strategies, outcome measurement, and conclusions.

3. Results

3.1. Search Process. A total of 2424 articles were retrieved from six databases. After removing duplicate records ($n=1130$) and screening by title and abstract, 52 full-text articles were reviewed. Articles were excluded due to the following: the outcome did not include burnout ($n=10$), subjects included non-nursing staff ($n=25$), and the article did not present a systematic review ($n=8$). Nine articles

from six databases were retained. Two additional articles were obtained using a citation search. Eleven articles were included in the analysis (Figure 1).

3.2. Characteristics of Included Articles. The articles were published between 2012 and 2021, with two of the eleven systematic reviews including meta-analyses (Table 1). The number of studies synthesized with the systematic review ranged from 6 to 25, encompassing a total of 467 to 6,055 subjects. Researchers were represented from Germany ($n=4$), Canada ($n=2$), and one each from Taiwan, Korea, Australia, Malaysia, and Iran. The included studies in the review encompassed a global perspective, covering Europe (with countries such as the Netherlands, Spain, Italy, Germany, Ireland, the UK, Portugal, Denmark, Sweden, Norway, Greece, and France), the Americas (the USA, Canada, and Brazil), the Middle East (Iran and Israel), Asia (India, Japan, Turkey, China, Taiwan, Malaysia, Hong Kong, and Korea), and Oceania (Australia). The RCT was the most researched design within the reviews. The outcome indicators represented three categories: mental perception (e.g., stress, burnout, depression, and life satisfaction), physical symptoms (e.g., muscle pain and insomnia), and work-related (e.g., patient care and job satisfaction).

3.3. Quality Appraisal. The quality of the eleven included articles was evaluated using the JBI CACSRRS. In the eleven systematic reviews, 10 (90.9%) achieved a yes score on 8 of the 11 questions (Table 2). All articles met of 100% for questions 1, 7, 8, 10, and 11. Four questions (Q2, Q3, Q4, Q5, and Q6) were met between 64% and 91%. Question 9, "the likelihood of publication bias," was answered for only one review due to the low number of studies in the other reviews. All eleven systematic reviews were included for qualitative integration.

3.4. Effectiveness of Strategies and Interventions

3.4.1. Strategies and Interventions for Reducing Burnout. Among the 11 selected systematic reviews, a total of 145 studies were included. After removing duplicates, 131 remained, of which 64 studies discussed the three strategies for the outcome indicators of burnout or occupational stress. Within these 64 studies, the strategies employed included combinations in 6 studies (four mental health + physical activities and two mental health + professional education) and single strategies in 59 studies (25 for mental health, 24 for physical activities, 9 on professional education).

Among the 64 studies, the distribution of strategies applied was as follows: mental health ($n=31$, 44%), physical activities ($n=28$, 40%), and professional competences ($n=11$, 16%). In the 31 studies focused on mental health strategies, three types of interventions were included: mindfulness-based stress reduction (MBSR), stress and relaxation management, and resilience and cognition training. Two studies combined two approaches (stress and relaxation management + resilience and cognition training; MBSR + resilience and cognition training). Thus, in these 31

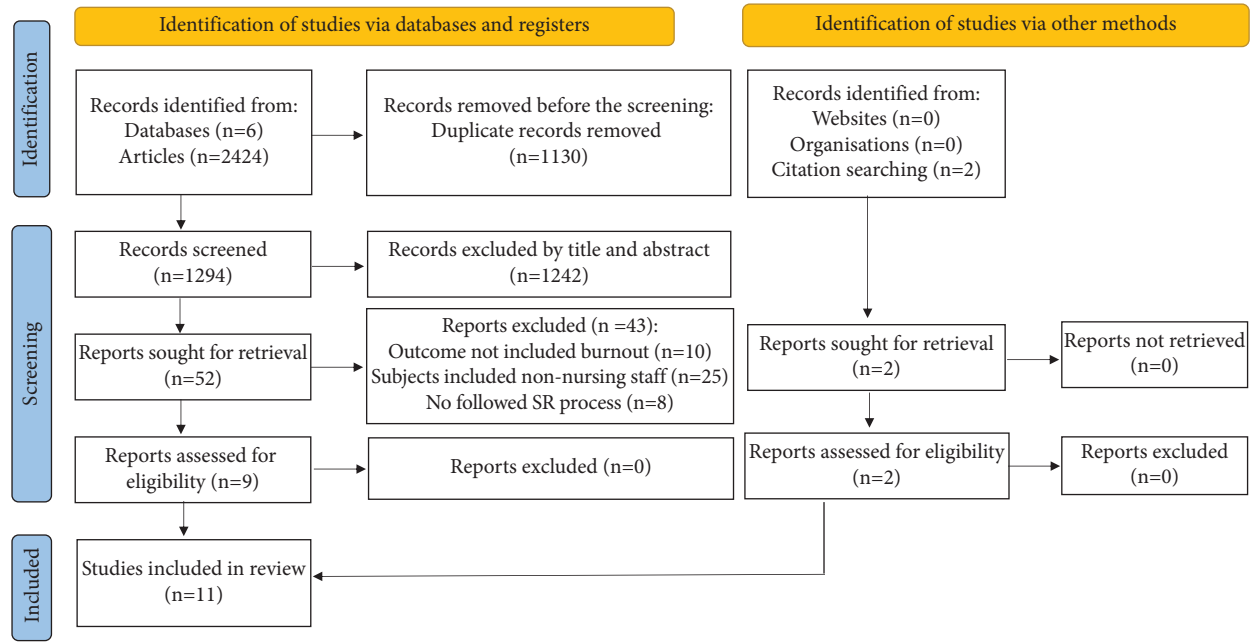


FIGURE 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram. From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021; 372: n71. doi: 10.1136/bmj. n71.

mental health strategy studies, the distribution of the interventions was MBSR (48%), stress and relaxation management (27%), and resilience and cognition training (24%). In the 28 studies related to the strategies of physical activities, two types of interventions were yoga and general physical exercise, with their distribution being yoga (71%) and general physical exercise (29%). Among the 11 studies on professional competences strategies, two types of interventions were competence education (73%) and coworker supervision (27%) (Figure 2).

3.4.2. Effectiveness of Interventions for Reducing Burnout. Among the 64 studies reviewed, 23 mentioned the effectiveness of interventions on emotional exhaustion (EE), with 17 (74%) reporting a significant reduction in EE. Among these 17 studies, the interventions most frequently effective in reducing EE included MBSR mentioned 5 times, competence education 4 times, resilience and cognition training 3 times, stress and relaxation management 2 times, coworker supervision 2 times, and yoga once. 19 studies addressed the impact of interventions on depersonalization (DP), with 11 (58%) reporting effective reductions. The most frequently effective measures for reducing DP included MBSR 4 times, resilience and cognition training 3 times, competence education 2 times, stress and relaxation management once, coworker supervision once, and yoga once. 20 studies discussed intervention effects on low personal accomplishment (LPA), with 10 (50%) achieving significant reductions. The interventions most effective in reducing LPA were MBSR, resilience and cognition training, and competence education, each mentioned 3 times, followed by coworker supervision 2 times, stress and relaxation management once,

and yoga once. 42 studies examined the effectiveness of interventions on work stress, with 32 (76%) noting substantial stress reductions. The most frequently effective strategies to reduce work stress were yoga 17 times, MBSR 6 times, stress and relaxation management 5 times, competence education twice, and general physical activities twice (Figure 3).

4. Discussion

An umbrella review included a comprehensive evaluation of evidence derived from eleven systematic reviews of 131 different research studies focused on reducing nurse burnout. Strategies formed three main categories: mental health, physical activity, and professional competence. The interventions which positively contributed on burnout were MBSR, resilience and cognition training, and stress and relaxation as well as yoga in occupational stress.

4.1. Enhancing Mental Health. MBSR is the most frequent mental health strategy applied to reduce burnout based on the study findings. Nurses face a high workload and poor working conditions [29] and are at risk of developing psychological distress [30]. Many studies have documented the effectiveness of MBSR in reducing stress [13, 14]. For physical mechanism, MBSR practices can be crucial for the body's defense against infections and improving health [31, 32]. MBSR practices cultivate self-compassion, helping individuals to face adversity without succumbing to self-criticism or negative self-evaluation, which are key factors in burnout [33]. When conducted in group settings, mindfulness practices strengthen interpersonal connections

TABLE 1: Key characteristics of systematic reviews in the umbrella review ($n = 11$).

First author/year/ country	No. of included studies (year of publication)	Total no. of subjects	n /countries represented	n /study designs represented	n /strategies	Outcomes	Conclusions
Stubert/2021/ Germany	7 (1994–2018)	1104	4 USA 1 China 1 UK 1 Germany	1 RCT 3 Cohort 3 CCT	2 Stress management and coping 2 Professional enhancement 2 Communication and conflict management 1 Problem-solving	↑ Work atmosphere ↑ Personal competences ↑ Work satisfaction ↓ Psychological strain ↓ Insomnia ↓ Emotional exhaustion	Leadership intervention can maintain or foster mental health among nurses
Jung/2021/Korea	17 (1993–2020)	1430	4 China 3 US 2 Taiwan 2 Japan 1 Korea 1 Greece 1 Turkey 1 France 1 Malaysia 1 Iran	15 Parallel RCT 2 Cross-over RCT	3 Relaxation 3 Music-related 2 Resilience 5 MBSR 4 Yoga 1 Meditation 1 Aromatherapy	↑ Job satisfaction ↑ Quality of life ↑ General health ↓ Burnout ↓ Stress ↓ Anxiety ↓ Depression ↓ Fatigue	Yoga showed significant effect on burnout
Bischoff/ 2019/ Germany	9 (1995–2017)	690 (9–282)	4 USA 1 China 1 Brazil 2 Sweden 1 Taiwan	7 RCT 1 Quasi 1 Pilot pre-post	4 Yoga 2 Physical exercise 1 Qigong 1 Tai Chi 1 Individually designed training	↓ Emotional exhaustion ↓ Depersonalization ↓ Stress	Yoga and qigong can reduce stress among health personnel
Gillman/2015/ Australia/	20 (1994–2013)	1811 (6–563)	8 USA 1 Australia 1 Italy 5 Canada 2 Sweden 1 Wales 1 Taiwan 1 Portugal	4 mixed 5 Grounded 3 Phenomenology 4 cross-sectional 1 concept mapping 2 Pre-post 1 RCT	2 Emotion-focused techniques 9 Stress management and coping 3 Compassion fatigues 2 Hoping and self-transcendence 2 Death education 2 Mentoring or buddy systems 1 Consultation	↑ Resilience ↑ Coping ↑ Job satisfaction ↑ Quality of care ↓ Stress ↓ Burnout	Many strategies can help nurses to cope with work challenges including strategies which promote team connection, help reduce stress and recovery, or help to deal with emotions from experiences

TABLE 1: Continued.

First author/year/ country	No. of included studies (year of publication)	Total no. of subjects	n/countries represented	n/study designs represented	n/strategies	Outcomes	Conclusions
Ghawadra/2019/ Malaysia	9 (2006–2017)	467	1 Canada 3 USA 1 Japan 1 Malaysia 1 Brazil 2 Portugal	2 RCT 3 QCT 4 Pre-post	7 MBSR 1 Mindful-gym 1 Self-related processing	<ul style="list-style-type: none"> ↑ Job satisfaction ↑ Quality of life ↑ General health ↑ Relaxation ↑ Sense of coherence ↑ Self-compassion ↑ Serenity ↑ Empathy ↑ Mindfulness ↑ Happiness ↓ Burnout ↓ Stress ↓ Anxiety ↓ Depression ↓ Fatigue 	MBSR can reduce burnout, stress, anxiety, depression, and fatigue, and increase job satisfaction, quality of life and so on among nurses
Otto/2021/ Germany	6 (1997–2019)	716	2 Norway 2 Netherlands 1 Australia 1 USA	6 RCT	<ul style="list-style-type: none"> 2 Comprehensive orientation training 2 Exercise 1 Positive psychology 1 Acceptance and commitment therapy (ACT) 1 Clinical lesson 1 Emotion training 1 supervision meeting 1 Stress management 	<ul style="list-style-type: none"> ↑ Job satisfaction ↑ Mental health ↑ Physical health ↓ Burnout ↓ Neck complaints 	Cognitive-behavioral and multicomponent interventions can improve physical and mental health, job satisfaction, and can reduce burnout and neck complaints among elderly care nurses
Westermann/ 2014/Germany/	16 (2001–2012)	2253 (21–384)	3 Canada 1 Italy 3 Germany 3 Australia 1 Denmark 1 UK 2 USA 2 Netherlands	10 RCT 5 Quasi 1 Pre-post	<ul style="list-style-type: none"> 13 Innovative caring strategies and communication skills for dementia 4 Mentoring or buddy systems 1 Stress coping 1 MBSR 1 Ergonomic and psychosocial training 	<ul style="list-style-type: none"> ↓ Low personal accomplishment ↑ Job satisfaction ↑ Intrinsic motivation ↓ Emotional exhaustion ↓ Depersonalization 	Only a few interventions have positive influences on nursing staff burnout, we need more evidence to prove that can prevent burnout

TABLE 1: Continued.

First author/year/ country	No. of included studies (year of publication)	Total no. of subjects	n/countries represented	n/study designs represented	n/strategies	Outcomes	Conclusions
Ciezar-Andersen/ 2021/Canada/	25 (1998–2019)	1778	10 India 8 USA	12 RCT 1 Quasi 9 Pre-post 2 Qualitative 1 Mixed	25 Yoga	<ul style="list-style-type: none"> ↑ Coping in acutely stressful situations ↑ Psychiatric ↑ Physical health ↑ Self-compassion ↑ Self-care practices ↑ Quality of care ↑ Mindfulness ↑ Concentration ↓ Stress ↓ Anxiety ↓ Depression ↓ Burnout ↓ Musculoskeletal aches and pains 	Yoga can improve mental and physical health among HHPs and HHP students
Aryankhes/2019/ Iran	18 (12 for nurses) (2006–2017)	6055	2 UK 4 USA 4 Netherlands 1 Australia 1 Japan 1 Canada 2 Turkey 1 Iran 1 Israel 1 China	12 RCT 6 pretest-post-test	<ul style="list-style-type: none"> 1 Thankful event 2 Electronic-mental health care 1 Consultation with physician 1 Participatory program 2 Yoga 1 Communication skill training 1 Professional program 1 Cognitive and emotive training 1 Psychosocial training 1 Coping skill 1 MBSR 	<ul style="list-style-type: none"> ↓ Emotional exhaustion ↓ Depersonalization 	The interventions used to improve burnout were communication skills, teamwork, participatory programs, and psychological interventions such as Yoga, meditation, and MBRS
Lee/2016/Taiwan	7 (1998–2014)	766	2 USA 2 Netherlands 1 Canada 1 Spain	5 RCT 2 Quasi	<ul style="list-style-type: none"> 1 Cognitive behaviors meeting 2 Coping and stress management 2 Refresher session 2 MBSR 1 Team-based supported 1 Cognitive coping strategies 1 Problem-solving 	<ul style="list-style-type: none"> ↓ Emotional exhaustion ↓ Depersonalization ↑ Low personal accomplishment 	Coping strategies can reduce nurse burnout

TABLE 1: Continued.

First author/year/ country	No. of included studies (year of publication)	Total no. of subjects	<i>n</i> /countries represented	<i>n</i> /study designs represented	<i>n</i> /strategies	Outcomes	Conclusions
Suleiman-Martos/ 2020/Canada	17 (2005–2019)	632 (13–91)	8 USA 2 Australia 1 Ireland 1 Brazil 1 Portugal 2 Canada 1 Iran 1 Japan	8 RCT 9 Quasi	17 MBSR	↑ Physical health ↑ Mental health ↑ Quality of care ↑ Resilience ↑ Life satisfaction ↑ Self-compassion ↑ Low personal accomplishment ↑ Job satisfaction ↓ Emotional exhaustion ↓ Burnout ↓ Stress ↓ Depression ↓ Depersonalization	MBSR and MBSCR can reduce burnout among nurses. However, it needs more evidence to prove it

TABLE 2: Quality appraisal of included systematic reviews using JBI ($n = 11$).

Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	No. of questions met
[10]	O	O	O	X	O	O	O	O	N/A	O	O	9
[25]	O	O	O	X	O	O	O	O	N/A	O	O	9
[14]	O	X	U	O	O	O	O	O	N/A	O	O	8
[15]	O	O	O	O	O	O	O	O	N/A	O	O	10
[26]	O	O	O	O	O	O	O	O	N/A	O	O	10
[12]	O	O	O	O	O	O	O	O	N/A	O	O	10
[27]	O	X	O	O	O	O	O	O	N/A	O	O	9
[13]	O	O	O	X	O	O	O	O	O	O	O	10
[28]	O	X	O	O	X	X	O	O	N/A	O	O	7
[9]	O	X	O	O	O	O	O	O	N/A	O	O	9
[11]	O	O	O	X	O	O	O	O	N/A	O	O	9
% meeting criteria	100	63.6	90.9	63.6	90.9	90.9	100	100	9.1	100	100	Range 7–10

Note. Met appraisal question (O)/not meet appraisal question (X)/unclear (U)/not applicable (N/A); Question of checklist: (1) Is the review question clear and explicitly stated? (2) Were the inclusion criteria appropriate for the review question? (3) Was the search strategy appropriate? (4) Were the sources and resources used to search for studies adequate? (5) Were the criteria for appraising studies appropriate? (6) Was critical appraisal conducted by two or more reviewers independently? (7) Were there methods to minimize errors in data extraction? (8) Were the methods used to combine studies appropriate? (9) Was the likelihood of publication bias assessed? (10) Were recommendations for policy and/or practice supported by the reported data? (11) Were the specific directives for new research appropriate?

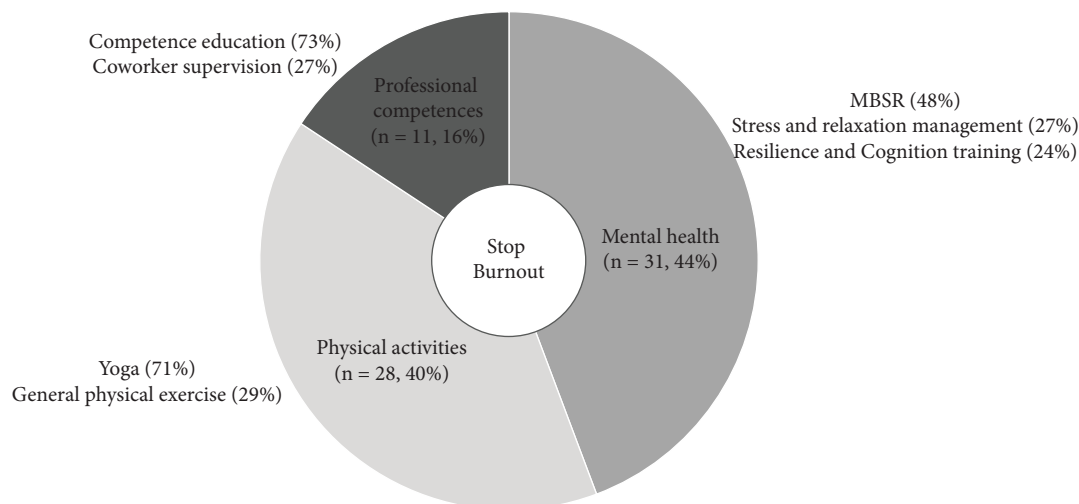


FIGURE 2: The strategies and interventions for reducing nurse burnout.

among nurses, providing a network of emotional support that is vital for managing work-related stress and reducing the risk of burnout [34].

A typical MBSR program consists of two to three hours of instruction per week for eight weeks and requires regular practice to reap its full benefits. However, some factors should be considered for the individuals [35, 36]. (1) Time commitment: a typical MBSR program consists of two to three hours of instruction per week for eight weeks; it may be challenging for some individuals to commit this amount of time. (2) Requires practice: MBSR requires regular practice to reap its full benefits; a busy schedule may make this difficult for some individuals. (3) Not a substitute for professional help: the MBSR program should not be regarded as a substitute for professional medical or

psychological care. In cases involving mental or physical illness, it is essential to seek professional assistance.

4.2. Increasing Physical Activity. Increasing physical activity was the second most frequently strategy for mediating nursing burnout, with yoga being the most common activity. Physical activity influences hormone levels, including the stress hormones. Maintaining physical activity provides a positive contribution to human psychoneuroimmunology and improved mental health [37]. The systematic review of Dutta et al. [38] described the physical and psychological benefits of yoga. However, yoga practitioners must be cautious of (1) musculoskeletal injuries: injuries to the musculoskeletal system are caused by the improper position,

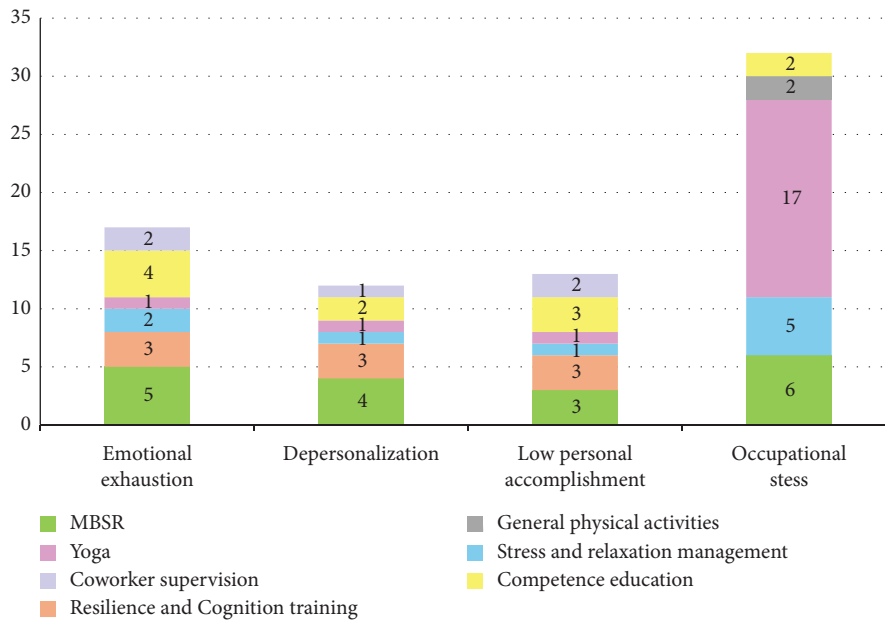


FIGURE 3: The effectiveness of interventions for reducing emotional exhaustion, depersonalization, low personal accomplishment, and occupational stress.

which can lead to muscle, bone, and joint problems [39]; (2) overstretching: an individual who overstretching their body or pushes it beyond its limits can lead to both pulled muscles and torn ligaments as a result of overstretching or pushing the body beyond its maximum ability [40]; and (3) physical exhaustion: for beginners or individuals with underlying health conditions, intense yoga sessions can sometimes result in physical exhaustion [41].

4.3. Improving Professional Competence. Professional competence was the third strategy, and professional competence education and coworker supervision were the important interventions in the current systematic reviews. The nurses' professional competence is reflected in their attitudes, knowledge, and psychosocial and psychomotor skills [42]. Nursing professional competence refers to the ability of nurses to demonstrate various abilities such as personal characteristics, professional attitudes, values, knowledge, and skills as they carry out their professional responsibilities [43]. Some researchers emphasized the significance of professional values on nursing competence and found the negative relationship between professional values and burnout [44, 45]. On the other hand, work-related stress occurs when people are expected to perform tasks beyond their abilities which requires coping mechanisms. Improving professional competence can provide confidence which can lead to a sense of mastery and control. Situational control reduces the stress associated with uncertainty and ambiguity for a decrease in burnout [45, 46]. Nurses possessing high levels of professional competence are typically well-equipped with the necessary knowledge, skills, and experience to adeptly handle challenging situations and workloads [47].

Additionally, nurses with higher levels of professional competence reported stronger relationships with their colleagues, likely because they are more likely to be seen as competent and trustworthy [48]. Many research studies have indicated that good interpersonal relationships are an important factor in combating burnout [49, 50]. Therefore, higher professional competence can positively contribute to good interpersonal relationships and self-confidence at work, which can then reduce stress and burnout.

4.4. Implications for Managers. The umbrella review highlighted the importance of manager facilitation in addressing nursing burnout through individual-based strategies. Key recommendations include routine assessment of burnout level, offering MBSR and yoga programs, fostering workplace social support networks, and organizing professional competence development programs.

First, regular assessment of the burnout level is necessary because the effectiveness of interventions would be ineffective after 6 months [11]. Managers can tailor the schedule for burnout assessments to align with the organization's culture and the individual characteristics of employees. This approach allows for a thorough evaluation of burnout levels, taking into account differences across various professional nursing tiers and considering significant occurrences like hospital accreditation or personal milestones. Second, managers can arrange the MBSR and physical activities such as yoga or general physical exercise training for nurses. Before the nurses practice the MBSR or yoga activities by themselves, well-trained instructors can provide comprehensive training and prevent the adverse events of MBSR and yoga. On the other hand, the instructors can suggest the appropriate period of MBSR or skill of yoga according to individual

characteristics. Third, resilience improvement is also an important factor. Studies indicate that resilience can combat burnout [15, 26]. Health organizations need to improve the well-being of nurses and the managers can implement training courses such as resilience training to prevent the incidence of cumulative burnout [51]. Fourth, nurse leaders can mitigate the negative impact of burnout on their professional values by strengthening and improving their professional value education through seminars and nursing in-service education programs [52]. In addition, nurse managers can provide continuing education opportunities based on the working unit or level of professional capacity to enhance professional competence among nurses [53]. The competence improvement education can teach nurses to determine for themselves how to handle their problems and how to improve their situation through meaningful dialog and engagement with nurse leaders concerning their work-life issues. Finally, the peer support and supervision system is necessary. A network fosters a sense of belonging and security, enhancing individuals' ability to cope with stress and burnout. Designing leisure activities for nurses can contribute to interpersonal relationships and decrease stress [54].

5. Strengths and Limitations

An umbrella review systematically compiled and synthesized evidence on individual-based strategies for reducing stress and burnout among nurses in hospital-based settings. The review marks a significant step in collating evidence and identifying the research on the most frequently used strategies. The review was limited by only including published systematic reviews and omitted grey literature or unpublished studies. Overlapping sources across the systematic reviews led to inconsistent outcomes and may have rendered burnout metrics inaccurate. Additional mental health indicators, such as anxiety or depression, may have confounded burnout findings. The umbrella review revealed that while numerous interventions are commonly used, many have not been thoroughly tested. More research is needed for in-depth analysis of these interventions.

6. Conclusion

Strategies for reducing nurse burnout are focused on mental health, physical activity, and professional competence. Nurses can adopt personal preference strategies and self-help interventions to reduce burnout.

Data Availability

Data are available upon request.

Additional Points

What Is Already Known about the Topic? (1) Nurse burnout is a widespread and global problem. (2) Nurse burnout has been associated with negative individual and work-related outcomes. (3) Various strategies have been implemented to reduce nurse burnout. *What This Paper Adds.* (1) Strategies to reduce burnout can be categorized into three domains:

mental health, physical activities, and professional competence. (2) The interventions most applied were mindfulness-based stress reduction, yoga, and competence education. (3) Individual-based strategies were shown to effectively eliminate emotional exhaustion, depersonalization, and occupational stress.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Effects of Job Crafting and Leisure Crafting on Nurses' Burnout: A Machine Learning-Based Prediction Analysis

Yu-Fang Guo ¹, Si-Jia Wang ¹, Virginia Plummer ², Yun Du ¹, Tian-Ping Song ³
and Ning Wang ³

¹School of Nursing and Rehabilitation, Shandong University, Jinan, Shandong, China

²Institute of Health and Wellbeing, Federation University Australia, Victoria, Australia

³Qilu Hospital of Shandong University Dezhou Hospital, Dezhou, Shandong, China

Correspondence should be addressed to Yu-Fang Guo; cdguoyufang@163.com

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Aim. To explore the status of job crafting, leisure crafting, and burnout among nurses and to examine the impact of job crafting and leisure crafting variations on burnout using machine learning-based models. **Background.** The prevalence of burnout among nurses poses a severe risk to their job performance, quality of healthcare, and the cohesiveness of nurse teams. Numerous studies have explored factors influencing nurse burnout; however, few involved job crafting and leisure crafting synchronously and elucidated the effect differences of the two crafting behaviors on nurse burnout. **Methods.** Multicentre cross-sectional survey study. Nurses ($n = 1235$) from four Chinese tertiary hospitals were included. The Maslach Burnout Inventory-General Survey, the Job Crafting Scale, and the Leisure Crafting Scale were employed for data collection. Four machine learning algorithms (logistic regression model, support vector machine, random forest, and gradient boosting tree) were used to analyze the data. **Results.** Nurses experienced mild to moderate levels of burnout and moderate to high levels of job crafting and leisure crafting. The AUC (in full) for the four models was from 0.809 to 0.821, among which the gradient boosting tree performed best, with 0.821 AUC, 0.739 accuracy, 0.470 sensitivity, 0.919 specificity, and 0.161 Brier. All models showed that job crafting was the most important predictor for burnout, while leisure crafting was identified as the second important predictor for burnout in the random forest model and gradient boosting tree model. **Conclusion.** Even if nurses experienced mild to moderate burnout, nurse managers should develop efficient interventions to reduce nurse burnout. Job crafting and leisure crafting may be beneficial preventative strategies against burnout among nurses at present. **Implications for Nursing Management.** Job and leisure crafting were identified as effective methods to reduce nurse burnout. Nurse managers should provide more opportunities for nurses' job crafting and encourage nurses crafting at their leisure time.

1. Background

Nurses constitute the largest proportion of the healthcare workforce worldwide and play an essential role in clinical treatment, illness prevention, and health promotion. However, because of extensive job demands, scarce resources, work-family conflicts, and complex clinical work environments, nurses experience several burnout symptoms, such as emotional exhaustion, cynicism, and reduced professional efficacy [1, 2]. These phenomena adversely affect the quality of care, patient safety and satisfaction, job

performance, turnover rate, and the physical and mental health of nurses [3, 4]. According to a nationwide survey conducted in the United States of America, 16.6%–30.0% of nurses (3,957,661 samples) reported experiencing burnout and 31.5% of them listed burnout as a contributing factor to their decision to leave their positions [5]. A cross-sectional survey in 12 European countries showed that 10%–78% of nurses had burnout symptoms [6]. In the mainland China, the burnout rate is also high; for example, in Shanghai, it is 45.1% [7], and in Hunan, it is at 34.9% [8]. Given the current high levels of burnout among nurses worldwide, it has

become critical for hospital administrators, nurse managers, and nurses themselves to gain a deeper understanding of the factors that contribute to burnout to enhance the quality of clinical care, stabilize nurse retention, and improve the physical and mental health of nurses.

Job crafting is defined as the actions employees take in modifying their tasks and work relationships to promote their cognitive understanding of the job meaning and attain a greater person-job fit [9]. Previous studies have highlighted that job crafting is not only beneficial to employees' health (e.g., well-being and general health) [10, 11], work attitude (e.g., job satisfaction and organizational commitment) [12], and behavior (e.g., work engagement and creativity) [13] but is also conducive to organizational performance (e.g., quality of care and group innovation) [14, 15]. Literature review shows that increasing research had investigated the relationship between job crafting and burnout in nurses. Cumulative evidence has shown that job crafting can maintain a proactive balance between job demands and resources by fostering self-driven work behavior, consequently alleviating nurse burnout [16]. Several studies have found a moderate-to-high influence of job crafting on burnout [16, 17], whereas others have reported a rather small effect of job crafting on burnout [18]. Because the effect sizes of these studies were inconsistent, further investigation is required to provide new evidence.

Leisure crafting is a novel strategy for dealing with depleted resources and was firstly defined by Petrou and Bakker [19]. This strategy refers to individuals' proactive and self-initiated pursuit of off-job life to fulfill their goals, interpersonal connections, learning, and personal growth. Unlike job crafting, leisure crafting motivates individuals' passions and satisfies their psychological requirements by shaping their leisure activities in a proactive, deliberate, and serious manner [20, 21]. Existing studies indicated that leisure crafting can reshape the task and relational bounds of individuals' leisure, improve their sense of mastery, and help them acquire resources [22, 23]. Leisure crafting is believed to address individuals' needs and values and improve their ability to handle workplace stressors, thereby averting the negative effects of job demands [24]. Few studies have explored the effects of leisure crafting on work-related attitudes and behaviors, particularly burnout issues. Moreover, little is known about whether job crafting and leisure crafting have similar effects on burnout.

Conservation of resources' theory assumes that individuals have the motivation to invest their resources for accumulating additional resources to protect their health and well-being [25]. Based on the conservation of resources' theory, an excessive workload is a persistent threat to nurses' valued resources, which results in burnout [26]. While nurses' accumulation of resources can sustain and protect additional resources, which greatly alleviate burnout among nurses, several studies supported that both job crafting and leisure crafting play vital roles in acquiring and adjusting resources [10, 27]. Job crafting and leisure crafting represent resource gain processes as nurses cope with stressful job demands and enrich their leisure time that motivate them and enhance their ability to perform well [28]. Resources

gained from job crafting can improve nurses' ability to better fulfill their work obligations, which is conducive to reduce burnout [29]. Resources activated and replenished from leisure crafting can spill over to the work domain to improve nurses' work engagement and hence lighten nurse burnout [27]. Therefore, based on theoretical basis and the empirical studies, the study puts forward hypothesis 1: job crafting and leisure crafting are negatively influencing nurse burnout.

At present, most studies have investigated the factors influencing burnout using multiple linear regression models, which have high requirements for data features (including normal distribution and homoscedasticity). Machine learning, a common artificial intelligence-driven technology, has been successfully integrated into the field of health risk assessment. Unlike traditional statistics, machine learning models do not have any rules for data distribution and learn from provided samples to explore the complex and non-linear relations among measured variables [30]. Several studies have applied machine learning to test predictors of burnout and achieved good findings. However, most of them only used one type of machine learning model (e.g., convolutional neural network, multitask learning technique, and decision tree) [31, 32], which does not avoid bias caused by the model and confirms the most significant predictors of burnout.

The main objectives of this study were to provide a comprehensive description of job crafting, leisure crafting, and burnout among nurses from Chinese tertiary hospitals. We also aimed to evaluate the effects of job crafting and leisure crafting on burnout by developing and validating four machine learning-based models.

2. Methods

2.1. Study Design. The cross-sectional multicenter study design was employed to describe the status of job crafting, leisure crafting, and burnout among nurses and explore the associations among these variables.

2.2. Participants. There are 107 tertiary hospitals in Shandong Province, China (<https://www.doc88.com/p-11461558491027.html>). A convenience sampling method was used to recruit hospitals from the 107 tertiary hospitals. Nurses from the included hospitals, who met the inclusion and exclusion criteria, were required to participate in the online survey. The inclusion criteria included registered and licensed practical nurses who directly cared for patients. Nurses on sick leave or those in the process of turnover were excluded from the study.

A total of 1,754 nurses from the four tertiary hospitals were invited to complete the online questionnaires, and 1,235 responses were included in the final analysis (Supplementary file "Participation rate and sample size").

2.3. Measures. A personal demographic form, the Maslach Burnout Inventory-General Survey (MBI-GS), the Job Crafting Scale (JCS), and the Leisure Crafting Scale (LCS) were used for the online survey.

The personal demographic form included 10 questions to investigate nurses' sociodemographic information, such as sex, age, years of service, academic degree, marital status, do they have a child/children, professional qualifications, specialty area, monthly income, and shift work.

The MBI-GS was used to assess the nurses' burnout status. This 16-item seven-Likert scale was developed by Maslach and Jackson [33]. The Chinese version was translated by Li and Shi [34]. Three dimensions of the MBI-GS are "emotional exhaustion," "cynicism," and "reduced professional efficacy." A seven-point Likert scale (0 = never, 6 = every day) was used to score the items. The following equation, developed by Kalimo et al. [35], was used to calculate the total MBI-GS score. Total score for burnout = score for "emotional exhaustion" \times 0.3 + score for "cynicism" \times 0.3 + score for "reduced professional efficacy" \times 0.4. The minimum and maximum scores for burnout range from zero to six, with higher scores indicating severe levels of burnout. Cronbach's alpha coefficients for the MBI-GS were 0.88 in the study.

The JCS used to measure job crafting was developed by Tims et al. [36]. The Chinese version's validity and reliability were tested by Liao [37]. This 21-item scale has four dimensions (increasing structural job resources, increasing social job resources, increasing challenging job demands, and reducing obstructive job demands) and scores on a five-point Likert scale. The score for job crafting is the average score of the total items. Higher scores indicated greater job crafting experienced by nurses. In this study, Cronbach's alpha coefficients for the JCS were 0.95.

The nine-item LCS, developed by Petrou and Bakker [19], measured nurses' crafting during their leisure time. The validity and reliability of the Chinese version were examined by Guo et al. [38]. A five-point Likert scale (1 = not at all, 5 = very many) was used to score each item. The LCS score is the average of nine items. The LCS had good validity and reliability, with Cronbach's alpha coefficients of 0.95 in the current study.

2.4. Data Collection. This study was conducted at four tertiary hospitals between June 3 and October 31, 2022. The Wenjuanxing-Enterprise edition (Changsha Ranxing Information Technology Co., Ltd., Changsha, China) was used to develop the online survey. Two research assistants were recruited from each hospital. All research assistants were given a three-hour investigation training session before conducting the survey. Research assistants delivered an online questionnaire link and explanatory statements to the nurses via e-mail, WeChat, and other communication apps. Nurses who met the inclusion criteria were asked to complete the survey. Two push notifications (Dear participants, please remember to complete the online survey. Thank you.) were sent to nurses. The survey took 10–15 minutes to complete.

2.5. Ethical Considerations. Ethical approval (Human Sciences Ethics Committee of School of **, one University No. 2020-R-030) and hospital permissions were obtained for this study. Nurses who submitted the online survey were considered to have provided informed consent.

2.6. Data Analyses. Data were analyzed using SPSS 24.0, with descriptive analysis, *t*-tests (to compare burnout scores between two groups), ANOVA (to compare burnout scores' differences among three or more groups), and correlation tests (to evaluate the correlations among the measured variables). Kurtosis and skewness were used to describe the normal distribution of measured variables. Values for kurtosis were from -0.237 to 1.002 , and values for skewness were between -0.724 and 0.392 , indicating that, generally, the data were normally distributed. According to the Harman single-factor analysis, 36.7% of the variance could be explained by one factor, which suggests that no significant common method variance was found in the study. K-means clustering analysis was used to divide burnout into a low burnout group and a high burnout group.

A computer-generated random number sequence divided the data into training (70%) and validation (30%) cohorts. Python 3.9 was employed to conduct four machine learning algorithms (logistic regression model, support vector machine, random forest, and gradient boosting tree) to obtain models for predicting nurse burnout. The logistic regression model is one kind of generalized linear regression categories. Support vector machine employs kernel functions to map linearly indivisible data to a multidimensional feature space, which could deal with complex data such as high dimensional, nonlinear, and small sample size. Random forest is an integrated algorithm which uses decision trees as the main classifier. Random forest is applied to issues of classification and regression. Gradient boosting tree includes decision tree and gradient boosting. It can deal with tasks of classification and regression via additive model and forward distribution algorithms.

The burnout prediction models included 16 variables (independent variables: job crafting and leisure crafting; covariates: significant demographic characteristics; dummy variables: eight variables). Five repetitions of the 10-fold cross-validation were conducted to optimize the model parameters. The area under the receiver operating characteristic curve (AUC), accuracy, sensitivity, specificity, and Brier were calculated to compare the predictive performance of the models. Brier represents the average-squared distance from the predicted probability of the model to the actual probability. The lower the Brier scores, the better the model performance. A two-sided *p* value ≤ 0.05 was considered statistically significant.

3. Results

3.1. Demographic Characteristics and Burnout of Nurses. Most nurses were women (95.8%), married (80.9%), held bachelor's degrees (85%), and had a child/children (76.2%). Over half were 30–39 years old, had temporary employment, had worked less than 11 years in medical and surgical departments, and had shift work more than four times per month. Of these, 46.4% were lead nurses, and only 23.3% of the nurses' income was higher than 9000 Yuan (1,231 \$ USD) (Table 1).

The results of the bivariate statistical analysis showed that nurse burnout levels were significantly different according to age, years of service, marital status, child/children status, professional qualifications, specialty area, and shift work (each $p < 0.01$).

3.2. Descriptive and Correlation Analyses among Burnout, Job Crafting, and Leisure Crafting. The burnout level for nurses was 2.02 ± 1.05 , indicating that nurses experienced mild-to-moderate levels of burnout. The average score for job crafting was 4.05 ± 0.56 . The average score for leisure crafting was 3.84 ± 0.78 , suggesting that nurses had moderate-to-high levels of job and leisure crafting (Table 2).

The correlation analysis showed that burnout was significantly negatively correlated with job and leisure crafting (each $p < 0.01$) (Table 2). Nurses who experienced high burnout generally engaged in less job and leisure crafting.

3.3. K-Means Clustering Analysis for Burnout. According to the K-means clustering analysis, two clusters for burnout were found: the low-burnout group (final cluster center 1.24, $n = 678$) and the high-burnout group (final cluster center 2.97, $n = 557$) (Table 3).

3.4. Model Performance. The binary logistic regression analysis showed that job crafting, age, medical department, paediatric department, and shift work significantly influenced nurse burnout. Nurses who had lower job crafting, were younger in age, worked in medical and paediatric departments, and shifted work had a higher risk of experiencing severe burnout. Supplementary Files eTable 1 and eFigure 1 present the regression model results.

Support vector machine (SVM), random forest, and gradient boosting tree were employed to evaluate significant factors influencing burnout. The importance of the permutation features was calculated using the three machine learning algorithms. In the SVM model, the top five predictors were job crafting, age, child/children status, years of service, and leisure crafting (Supplementary file eFigure 2). In the random forest and gradient boosting tree models, the top five predictors were job crafting, leisure crafting, age, years of service, and professional qualifications (Supplementary file eFigures 3 and 4).

The performance of each model is summarized in Table 4. The receiver operating characteristic (ROC) curves for the validation cohort are shown in Figures 1(a) and 1(b). The

gradient boosting tree model performed the best, with an AUC of 0.821, accuracy of 0.739, sensitivity of 0.470, and specificity of 0.919. The Brier score for the gradient boosting tree was the lowest (0.161), indicating that the model was reliable.

4. Discussion

This study aimed to explore the status of job crafting, leisure crafting, and burnout among Chinese nurses and exam the effects of job crafting and leisure crafting on burnout using four machine learning algorithms. This study is one of the first investigations on this topic. We found that nurses experienced mild-to-moderate levels of burnout and moderate-to-high levels of job and leisure crafting. Furthermore, compared with leisure crafting, job crafting played a greater role in predicting burnout in SVM, random forest, and gradient boosting tree models. These important findings suggest that nurses plan their efforts to promote their job and leisure crafting and that nurse managers should adopt effective strategies to reduce burnout symptoms among nurses.

In the current study, nurses had mild-to-moderate levels of burnout. These results are supported by previous studies conducted in other countries [39, 40]. As nurses experience mild-to-moderate burnout, both nurse managers and nurses pay less attention to this chronic, persistent syndrome, which leads to severe outcomes in nurses' physical and mental health, job performance, and organizational commitment [41, 42]. Accordingly, raising managers' and nurses' concerns about burnout is vital, especially in mainland China. Furthermore, effective personal-oriented, organizational-oriented, and personal-organizational combined interventions should be implemented to reduce burnout among nurses.

In this study, the nurses experienced moderate-to-high levels of job crafting. This finding is consistent with the studies of Alharthi et al. [43] and Harbridge et al. [44]. A qualitative study revealed that nurses had passion and strengths in job crafting. They were actively job crafting in all aspects via activities, such as techniques' training, participating in working teams and committees, and being involved in programs [45]. Nurses proactively initiated and altered clinical tasks to address the requirements of their vulnerable patients, which could promote the quality of care and achieve more meaning in their jobs [46].

We found, quite interestingly, that nurses experienced moderate-to-high levels of leisure crafting. Studies have indicated that leisure crafting is an individual's adaptive behavior in leisure life, which can positively benefit work engagement, personal achievement, and organizational performance [47, 48]. Several leisure activities were believed to enhance individuals' leisure crafting, such as hobby participation, enjoying activities, and seeking a sense of purpose during leisure time [49]. Therefore, nurses are encouraged to pursue their hobbies and engage in leisure activities to produce crafting behaviors outside their work.

In the present study, four machine learning models were used to evaluate the effects of differences in job and leisure crafting on burnout among nurses. Although the predictive

TABLE 1: Demographic characteristics and burnout among nurses ($n = 1,235$).

Characteristics	n (%)	Burnout ($M \pm SD$)	Test statistics
<i>Sex</i>			
Men	52 (4.2)	1.98 \pm 0.95	$t = -0.271$
Women	1183 (95.8)	2.02 \pm 1.05	
<i>Age (years)</i>			
20–29	303 (24.5)	2.13 \pm 1.05	$F = 9.077^{**}$
30–39	734 (59.4)	2.06 \pm 1.03	
40–49	168 (13.6)	1.72 \pm 1.05	
50–59	30 (2.4)	1.48 \pm 0.97	
<i>Years of service</i>			
0–11	800 (64.8)	2.09 \pm 1.03	$F = 8.211^{**}$
12–23	349 (28.3)	1.99 \pm 1.06	
24–35	81 (6.6)	1.49 \pm 0.96	
>35	5 (0.4)	1.93 \pm 1.28	
<i>Academic degree</i>			
Diploma	8 (0.6)	1.51 \pm 1.32	$F = 1.569$
Associate degree	144 (11.7)	2.09 \pm 1.00	
Bachelor's degree	1050 (85.0)	2.01 \pm 1.06	
Master's degree and higher	33 (2.7)	2.27 \pm 0.78	
<i>Marriage</i>			
Single	209 (16.9)	2.29 \pm 1.08	$F = 6.002^{**}$
Married	999 (80.9)	1.96 \pm 1.03	
Divorced	26 (2.1)	2.05 \pm 1.26	
Widowed	1 (0.1)	3.12 \pm 0.00	
<i>Had child/children</i>			
No	294 (23.8)	2.26 \pm 1.10	$t = 4.470^{**}$
Yes	941 (76.2)	1.95 \pm 1.02	
<i>Employment</i>			
Temporary	696 (56.4)	2.07 \pm 1.04	$F = 2.649$
Personnel agency	254 (20.6)	2.03 \pm 0.99	
Authorized	285 (23.1)	1.90 \pm 1.05	
<i>Professional qualification</i>			
Nurse	192 (15.5)	2.07 \pm 0.96	$F = 3.584^{**}$
Senior nurse	412 (33.4)	2.11 \pm 1.10	
Lead nurse	573 (46.4)	1.98 \pm 1.03	
Associate chief nurse	50 (4.0)	1.74 \pm 1.05	
Chief nurse	8 (0.6)	1.10 \pm 0.66	
<i>Specialty area</i>			
Medical	402 (32.6)	2.10 \pm 1.03	$F = 2.592^{**}$
Surgical	256 (20.7)	2.08 \pm 1.03	
Gynaecology	106 (8.6)	1.86 \pm 1.01	
Paediatric	89 (7.2)	2.26 \pm 1.18	
Emergency	27 (2.2)	2.25 \pm 1.01	
Operating room	55 (4.5)	1.89 \pm 0.96	
Intensive care unit	53 (4.3)	1.92 \pm 1.00	
Outpatient services	102 (8.3)	1.81 \pm 1.05	
Others	145 (11.7)	1.86 \pm 1.09	
<i>Monthly income[#] (RMB, after tax)</i>			
≤ 3000	90 (7.3)	2.25 \pm 1.16	$F = 2.136$
3001–5000	343 (27.8)	2.09 \pm 1.06	
5001–7000	345 (27.9)	1.93 \pm 1.02	
7001–9000	169 (13.7)	2.01 \pm 1.03	
≥ 9001	288 (23.3)	1.99 \pm 1.04	
<i>Shift work</i>			
No	370 (30.0)	1.88 \pm 1.03	$F = 5.643^{**}$
<4 times/month	143 (11.6)	1.96 \pm 1.01	
≥ 4 times/month	722 (58.5)	2.10 \pm 1.06	

Note. $** p < 0.01$, $^{\#} 1$ US dollar = 6.54 Chinese Yuan.

TABLE 2: Descriptive and correlation analyses among burnout, job crafting, and leisure crafting of nurses.

	M \pm SD	Min-max	Burnout	Job crafting	Leisure crafting
Burnout	2.02 \pm 1.05	0.00–5.85	1		
Job crafting	4.05 \pm 0.56	1.00–5.00	-0.400**	1	
Leisure crafting	3.84 \pm 0.78	1.00–5.00	-0.281**	0.666**	1

Note. ** $p < 0.01$.

TABLE 3: K-means clustering analysis for burnout.

Groups	n	Final cluster centers	Scores
Low burnout group	678	1.24	0.00–2.10
High burnout group	557	2.97	2.11–5.85

TABLE 4: Model performance in predicting burnout in the validation cohort.

	AUC	Accuracy	Sensitivity	Specificity	Brier
Logistic	0.809	0.647	0.128	0.995	0.253
SVM	0.803	0.720	0.409	0.928	0.180
Random forest	0.820	0.733	0.443	0.928	0.167
Gradient boosting tree	0.821	0.739	0.470	0.919	0.161

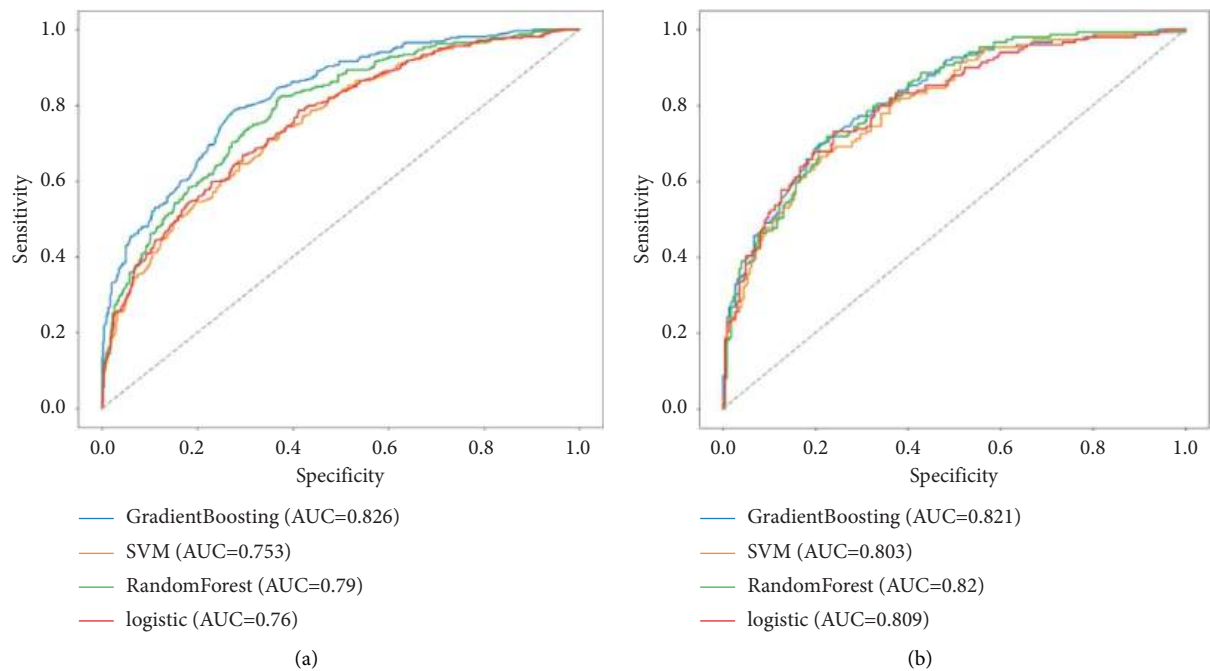


FIGURE 1: ROC curves of different machine learning models in (a) the training cohort and (b) the validation cohort.

capacity of the models was less satisfactory (AUCs ranged from 0.803 to 0.821), they can help nurse burnout management and their prediction can be improved by including more influencing variables. The sensitivity of the four models ranged from 0.128 to 0.470, indicating a low capacity to target nurses at a high risk of burnout. A possible reason is that some important predictors were not included in the models; as a result, the models could not sensitively include nurses with burnout. The specificity of the four models (ranging from 0.919 to 0.995) was good in the study,

indicating that the models specifically distinguished burnout from similar syndromes. Among the four models, the gradient boosting tree exhibited the best performance, with good sensitivity and calibration efficacy. The performance of the SVM model was similar to that of the random forest model, whereas that of the logistic model was far from satisfactory.

In this study, job crafting was the most important predictor of burnout in the four models. In contrast, the effect size of job crafting on burnout was small in the logistic

regression analysis (odds ratio = 0.123). Martinez et al. [50] reported that job crafting can explain 15.7%–19.7% of the variance in burnout in four dimensions (personal impact dimension, job dissatisfaction, motivational abandonment, and social climate dimension) among male nurses. Roskova and Faragova [18] reported that job crafting combined with age and position explained 14% of the variability in burnout among full-time employees. According to the Job Demands-Resources model, overwhelming job demands and limited job resources lead to burnout and job crafting is one of the mediating factors in this relationship. High job crafting encourages individuals to reframe their perceptions of work, engage in more workplace relationships, and change the nature of their tasks, which could decrease burnout and increase job satisfaction and well-being [51]. Considering the mild but significant effect of job crafting on nurse burnout, nurse managers and nurses must foster nurses' crafting behaviors in their clinical work through several typical interventions (e.g., job crafting workshops and job crafting exercises) [52, 53].

In the study, we creatively revealed the predictive value of leisure crafting on burnout using four machine learning models. Leisure crafting was the second or fifth most important feature for burnout in the SVM, random forest, and gradient boosting tree models. However, leisure crafting was not included in the final logistic regression model. Studies have reported that off-job crafting enables individuals to learn new things, expand existing hobbies, and have new personal connections, which can help them overcome severe challenges, promote personal growth, and achieve a good balance between job and leisure [54, 55]. Ugwu [56] demonstrated that leisure crafting alleviates the negative effects of counterproductive work behaviors caused by high job demands. Therefore, nurse manager and nurses should be aware of the importance of leisure crafting in burnout. Various leisure activities should be organized in establishing new interpersonal relationships, developing new skills, and learning new meanings in work and life [57].

Despite the fact the correlations between job crafting, leisure crafting, and burnout had been tested in the study, several limitations in this present study need to be considered. First, data were collected from four Chinese tertiary hospitals. Data from other hospital levels were lacking, which might have influenced the performance of the model in the external dataset. We suggest collecting sufficient data from different hospitals to validate the model. Second, regarding the cross-sectional study design, the effects of job and leisure crafting on burnout did not present a cause-and-effect relationship. Therefore, a longitudinal study is needed to better understand the predictions of job and leisure crafting on nurse burnout. Third, the study focused only on limited characteristics of nurses, such as demographic, job crafting, and leisure crafting. This might be the primary reason for the low sensitivity of the models. Therefore, several significant factors influencing burnout (e.g., job stress, job resources, work-family conflict, collegial support, and leadership) should be investigated and analyzed in future studies. Fourth, 52 male nurses were included in the study. Generalization of the model for male nurses should be

done with caution, and further surveys of this demographic are needed to clarify the model found in the study. Finally, nurses who were on sick leave and in the process of turnover were excluded from the study. Nurses in these conditions may experience high levels of burnout. Therefore, further studies could recruit nurses in these conditions to promote the generalization of the studies.

5. Conclusions

Burnout is a serious issue among nurses worldwide, raising great concerns among hospital administrators and nurse managers. In this study, nurses experienced mild-to-moderate levels of burnout; moreover, they had moderate-to-high levels of job and leisure crafting. These findings indicate that despite nurses having some burnout symptoms, they tend to apply crafting activities to increase their clinical skills and confidence and promote their interpersonal relationships and self-development. According to the machine learning-based predictive models, job crafting and leisure crafting were significant predictors of burnout, and job crafting was the most important predictor of burnout in the four models. Therefore, nurse managers are encouraged to create a casual crafting environment and take effective measures to improve nurses' crafting behaviors, ultimately reducing their burnout and promoting their clinical performance and organizational commitment.

6. Implications for Nursing Management

Burnout is a critical risk factor for the organizational health (e.g., organizational commitment and development) of hospitals and physical (e.g., inflammation, pain, and sleep disorder) and mental health (e.g., anxiety and depression) of nurses. Therefore, hospital administrators and nurse managers should pay more attention on this severe problem and take effective measures to alleviate burnout among nurses. According to the findings of this study, routine assessment of burnout among nurses should be added in health management strategies for nursing team.

In this study, job crafting was the most significant influencing factor for nurse burnout. Nurse managers should realize the positive effects of job crafting on nurse burnout. Several effective interventions (including job crafting training workshop, job crafting e-learning, and career crafting training) can be selected as training courses to meet the job crafting needs of nurses [58, 59]. Furthermore, nurse managers are encouraged to create a positive working environment and provide more organizational resources and opportunities for nurses to help them successfully deal with work challenges and achieve self-growth. In addition, several kinds of mutual-aid groups should be organized by nurse managers to support nurses find help from colleagues.

Leisure crafting is another new influencing factor for nurse burnout. According to this interesting finding, nurse managers are suggested to support nurses to cultivate personal hobbies and learn new knowledge via several group activities. Nurses are encouraged to fully use their leisure

time to keep good personal relationships, develop new skills, and obtain a different experience. Setting achievable goals and keeping active thinking in leisure activities are also beneficial to nurses work attitude and performance.

Data Availability

Data are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

The supplementary file presents the detailed results of the binary logistic regression analysis, support vector machine (SVM), random forest, and gradient boosting tree. (*Supplementary Materials*)

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Review Article

Elevating Elderly Cancer Care: A Systematic Review of Advanced Practice Nursing's Role in Senior Oncology Patients' Quality of Life

Cristian-David Useche-Guerrero ¹, **María-de-los-Ángeles Merino-Godoy** ¹,
Eva-María Barroso-Márquez¹, **Emilia Isabel Martins Teixeira da Costa** ^{2,3},
Rafaela Camacho Bejarano ¹ and **Francisco-Javier Gago-Valiente** ^{1,4}

¹Nursing Department, Faculty of Nursing, University of Huelva, Huelva 21007, Spain

²Nursing Department, Health School, University of Algarve, Faro 8000, Portugal

³Health Sciences Research Unit: Nursing, Nursing School of Coimbra, Coimbra 3000, Portugal

⁴Center for Research, Contemporary Thought and Innovation for Social Development (COIDESO), University of Huelva, Huelva 21007, Spain

Correspondence should be addressed to María-de-los-Ángeles Merino-Godoy; angeles.merino@denf.uhu.es

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Background. According to projections based on current trends, it can be anticipated that from 2024 onward, approximately 70% of all cancer cases will be diagnosed in individuals 65 years and older. Given this complex intersection between population ageing and cancer incidence, it is of great importance to address this issue from a comprehensive care perspective. Here comes the importance of advanced practice nurse into play. However, this figure is still not sufficiently valued in many countries. Its roles are also not clearly defined at the international level. For this reason, a systematic review of the scientific literature was carried out to analyze the impact of advanced practice nurse on the quality of life of older adults with cancer. **Methods.** Searches were carried out in PubMed, Web of Science (WoS), Scopus, CINAHL, LILACS, and ScienceDirect databases. They were limited to studies conducted in the last 7 years. Only open-access articles were selected. To analyze the chosen articles and assess their quality, the criteria of the PRISMA and CASPe statements were applied. All authors participated in both the selection of the articles and their analysis. **Results.** Of the initial 58 articles selected, a total of 10 articles were finally included, as they met the eligibility criteria established after further analysis. The results show a positive relationship between the advanced practice nurse intervention and quality of life in older adults with cancer. **Conclusions.** Advanced practice nurse (APN) plays a key role in the care of older adults with cancer, significantly improving their quality of life and contributing to the comprehensive care of these patients. The findings evidenced in this work support the integration of APNs in cancer care teams to improve patient experience and overall well-being.

1. Background

A major challenge is being grappled with modern society: the intertwined issues of population growth and rising life expectancy. Life has been expanded by advances in healthcare, but a complex scenario has been created by declining fertility rates. From 1950 to 2015, the population over 60 quadrupled, and it is projected to be 2.1 billion by

2050 [1]. Public health worldwide is being transformed by demographic changes due to evolving factors, with significant impacts on both health and social aspects [2].

An important concern in this context is the growing prevalence of chronic diseases related to age, including cardiovascular problems, degenerative conditions, dementia, and notably, cancer [1]. From the analysis of the most current statistics, it can be seen that around 20 million

new cases of cancer were reported worldwide in 2020. Among these, breast, lung, colon, prostate, and stomach cancers are noted as standing out, being currently recognized as some of the diseases with the highest incidence rates on the international scene [3]. By 2024 and beyond, around 70% of cancer cases are expected to be diagnosed in people 65 years and older, driven by ageing-related biological changes and a higher likelihood of comorbidities. This poses a significant risk to the quality of life for older individuals [4, 5].

To tackle the challenges of ageing and increased cancer rates, a holistic strategy is essential. Nursing plays a crucial role by adopting a comprehensive perspective, considering individual differences, and tailoring personalized solutions for better elderly life quality [6].

Quality of life in cancer patients is a key concept in nursing, encompassing general well-being in various dimensions. Its understanding has evolved since its origin in the post-World War II in the United States [7]. Originally, quality of life in cancer patients was assessed through objective measures such as survival and physical function. However, psychologists found that these could not fully explain variations. Subjective interpretations, such as happiness and life satisfaction, became crucial. These subjective factors often have a more significant impact on the quality of life of patients than objective factors alone [7].

In this context, the concept of health-related quality of life (HRQoL) emerged to capture the interaction between health and quality of life in a more holistic way [7]. To measure the HRQoL in cancer patients effectively, it is essential to consider multiple components such as functional, cognitive, emotional, spiritual, social, and economic aspects. Assessing specific problems and symptoms, such as pain and fatigue, is crucial. This comprehensive approach not only aids in clinical decision-making but also identifies vulnerable patient groups that need personalized care. It helps to evaluate the impact of treatment on quality of life, tolerability, and adherence. Nursing plays a key role in providing complete care and improving the overall quality of life for cancer patients [4].

In January 2018, the Andalusia Health Quality Agency (Spain) presented a professional competency manual for advanced practice nurses (APNs) in cancer care that includes competence in complex care coordination, such as in the case of the elderly with cancer [8, 9]. In Spain, there is a distinction between generalist and specialist nurses. However, with the increasing demand for health services and the need for highly specialized care, the new role of APNs has arisen. This model draws inspiration from Anglo-Saxon countries such as the United Kingdom, Canada, Australia, and New Zealand, adapting to the evolving complexity of health systems [5]. In the international context, advanced practice nurse is increasingly gaining momentum in different countries. However, there is a common denominator which is the need to provide clarity about this role in the provision of health services [10].

The concept of the APN originated in the United States during the 1960s and was later adopted in other countries, including the United Kingdom, Canada, and Australia.

Following the National Cancer Act of 1971, which established a comprehensive framework for cancer prevention, diagnosis, and treatment in the U.S., APNs initially focused on cancer management and research. As treatments grew more complex, the need for improved coordination across cancer care facets became evident, leading to stronger interdisciplinary collaboration and integrated care. The United Kingdom's Calman-Hine's report recommended specialized multidisciplinary teams and oncology care networks, reflecting these needs. Similarly, in other countries such as Portugal, this role is fulfilled by specialized nurses who, although they may not carry the same title, perform comparable functions in providing expert care and coordinating healthcare services in their areas of specialization [8].

An APN is a highly skilled nursing professional who has obtained advanced educational credentials and clinical training beyond the basic nursing education and licensing required of a registered nurse (RN). APNs are prepared through a postgraduate degree, such as, a master's or doctoral program, which enables them to provide a higher level of care and take on roles that include direct patient care, consultation, education, research, and administration [8].

ICN emphasizes that APNs should conduct direct healthcare practices within their focus population. These nurses can play a crucial role in assessing and diagnosing the needs of senior oncology patients using theories such as the theory of unpleasant symptoms and the symptom management theory. Their expertise helps identify clusters of symptoms and assess their impact on patient's quality of life and functionality [11].

APNs play a multifaceted role in the care of elderly patients diagnosed with cancer, functioning across various capacities that directly impact patient outcomes. As consultants, they provide crucial guidance to healthcare professionals, patients, and families, ensuring personalized and understandable care plans. Their educational responsibilities are profound, with a focus on disseminating advanced nursing practices to clinical nurses in primary care settings and sociohealthcare residences, areas critical to the elderly population. APNs also engage in research, contributing to the development of innovative, evidence-based approaches that enhance cancer care. Furthermore, through transformational leadership, APNs implement significant changes in healthcare practices, advocating for improvements that optimize the treatment and recovery processes for senior oncology patients. These roles exemplify the APNs' integral contribution to a holistic healthcare approach, emphasizing their importance in both direct patient care and broader healthcare improvements [8].

Although the APN role is recognized globally, there is a scarcity of studies examining its impact on the quality of life of senior oncology patients. Updated information is crucial, especially postpandemic, to understand the quality of service perceived by the patient and academic variables related to proper training in this role. Older patients are a heterogeneous population ranging from those who are frail and dependent to those who are extremely active. Therefore, it is necessary to provide adequate geriatric care. Currently,

there is not enough evidence on whether nursing staff apply adequate and comprehensive care to senior oncology patients. APNs could have a relevant role in this comprehensive care, which is why it is important to know the experiences that already exist with these professionals [12].

Therefore, the objective of this research was to conduct a systematic review of the scientific literature to identify research studies that analyze the impact of APNs on the quality of life of older adults with cancer. This study further examines evidence of the effectiveness of advanced practice nurse roles in meeting the healthcare needs specifically the quality of life of senior oncology patients.

2. Materials and Methods

In this study, a systematic review of the scientific literature was carried out in which studies analyzed the relationship between APN interventions and the quality of life of older adults with cancer. PRISMA statement criteria were applied [13] for systematic reviews by comprehensively analyzing the selected articles. The study was carried out according to the guidelines of the Declaration of Helsinki. This research is registered in PROSPERO (International Prospective Register of Systematic Reviews) with the registration number 488680.

The PICO framework is a structured approach that helps in formulating precise clinical research questions. In the proposed study, the focus is on senior oncology patients (population), investigating the effects of advanced practice nurse care (intervention) in comparison to standard nursing care (comparison). The main goal is to determine the benefits of such specialized nursing interventions in terms of improved health outcomes (outcome). Accordingly, the research question formulated is as follows: "What are the benefits of advanced practice nurse care in improving health outcomes compared to standard nursing care among senior oncology patients?" This question aims to capture the specific impacts of advanced practice nurse on the care quality and health results in this vulnerable group, thereby guiding potential improvements in clinical practices.

2.1. Selection Criteria. The systematic review was carried out between February and March 2023 in PubMed, Web of Science (WoS), SCOPUS, CINAHL, LILACS, and ScienceDirect databases. The investigation focused on literature published within the past seven years, specifically from January 1, 2016, to March 31, 2023, and exclusively included open-access documents. Our aim was to derive recent and well-supported findings from a range of documentary materials, leading to the decision to incorporate both research studies and reviews, whether systematic or bibliographic in nature.

2.2. Search Strategy. The search strategy was approached by selecting the following search criteria: for PubMed ((“Advanced Practice Nurse” [Mesh]) AND “Aged” [Mesh]) AND “Neoplasms” [Mesh]; ((“Advanced Practice Nurse” [Mesh]) AND “Neoplasms” [Mesh]) AND “Quality of Life” [Mesh]; for WOS ((ALL=(advanced practice nurse)) AND

ALL=(neoplasms)) AND ALL=(quality of life); ((TS=(advanced practice nurse)) AND TS=(neoplasms)) AND TS=(quality of life); ((ALL=(advanced practice nurse)) AND ALL=(aged)) AND ALL=(neoplasms); for SCOPUS (TITLE-ABS-KEY (“advanced practice nurse”) AND TITLE-ABS-KEY (neoplasms) AND TITLE-ABS-KEY (aged)) AND PUBYEAR >2016 AND PUBYEAR <2023; (TITLE-ABS-KEY (“advanced practice nurse”) AND TITLE-ABS-KEY (neoplasms) AND TITLE-ABS-KEY (“quality of life”)); for CINAHL advanced practice nurse AND quality of life AND older adult AND cancer; advanced practice nurse AND neoplasms AND aged AND quality of life; for LILACS (advanced practice nurse) AND (cancer) AND (older adult) AND (quality of life); (advanced practice nurse) AND (aged) AND (neoplasms) AND (quality of life); for ScienceDirect advanced practice nurse AND quality of life AND cancer AND older adult.

2.3. Inclusion and Exclusion Criteria. The following inclusion criteria were used: (a) studies in which APN was analyzed, (b) consideration of quality of life and cancer variables, (c) studies in which the sample was an adult population, and (d) articles published in scientific journals. All articles included in this review had to meet the four criteria detailed above.

Exclusions from this study encompassed various document types, such as editor letters, commentaries, opinions, perspectives, guidelines, standards, and case series. To ensure the reliability and accuracy of our process, three authors (C.U.-G., F.-J.G.-V., and E.C.) independently assessed the relevance of the selected articles to the study’s objectives and adherence to the inclusion criteria. When the title, abstract, and keywords of the article were in doubt for inclusion, two other authors were included (R.C.-B.; M.-d.-l.-A.M.-G. and E.-M.B.-M.) to arbitrate the decision on their inclusion or exclusion.

The process of identifying and choosing articles, including those that were ultimately included or excluded, as well as the rationale behind their exclusion during the screening and selection stages, is depicted in the flowchart in Figure 1. This representation aligns with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which are aimed at enhancing the thoroughness in the reporting of systematic reviews and meta-analyses [14].

2.4. Data Extraction. The data extraction process was carried out through extensive trials and postsearch proceedings. This started by reviewing, primarily and meticulously, the title, abstract, method, results, and conclusions of each article. Data were extracted as found in their respective studies at the time of review and were inserted into Table 1

In this systematic review, the selection of variables was guided by the PICOS framework [25], encompassing participants, interventions, comparisons, outcomes, and study design. With this strategy, it was possible to delimit the inclusion criteria and, based on them, carry out a qualitative analysis of the results. In addition, the research incorporated other pertinent variables such as the authors, year of publication, country, reference article, study objectives,

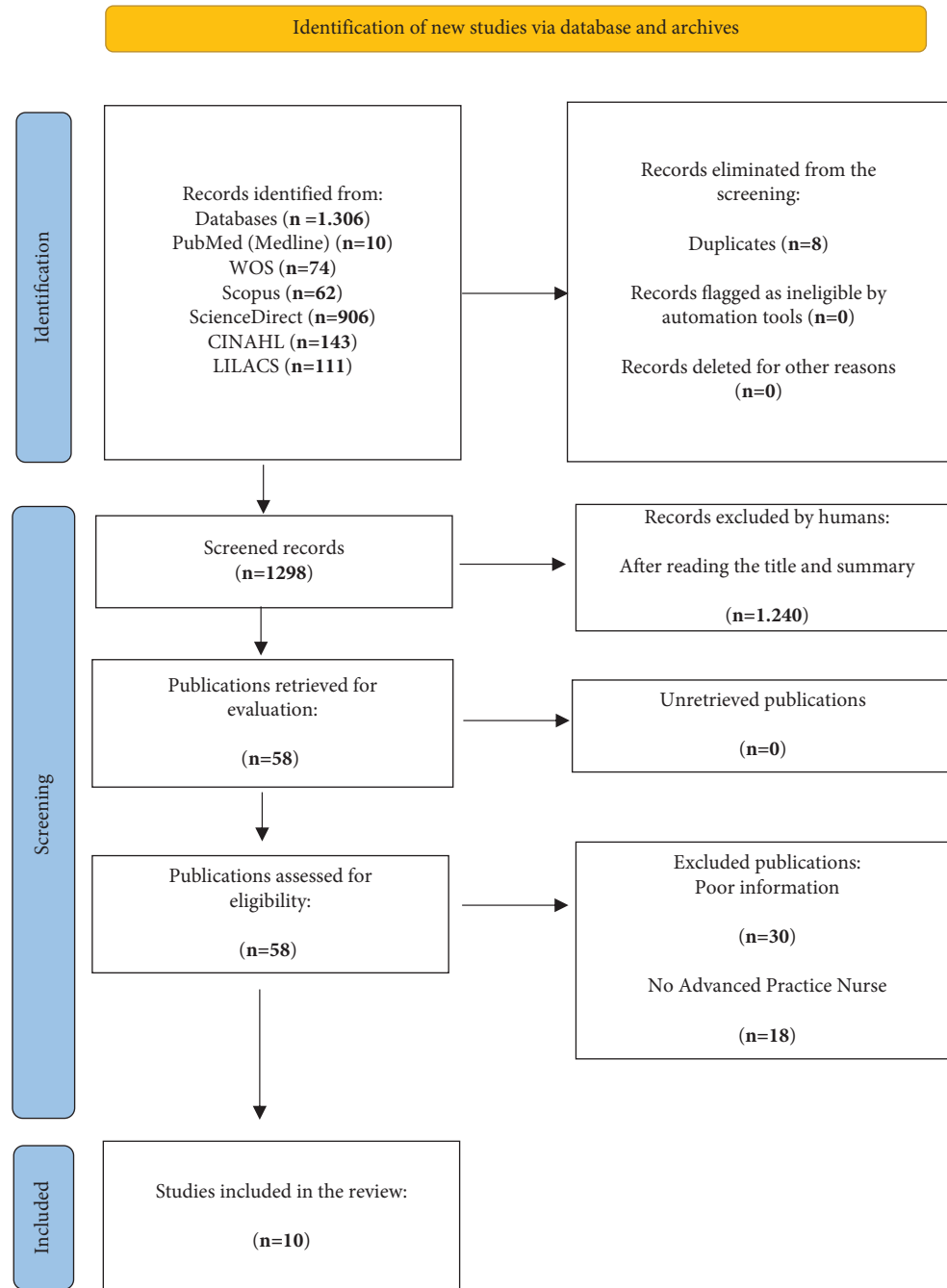


FIGURE 1: Flowchart of the systematic review process according to the statements of the PRISMA protocol.

participant details, variables measured, and the scales used. With data extraction, a document was created with a set of data and was hosted in the Arias Montano Institutional Repository [26].

2.5. Presentation of the Results: Adherence to Quality Initiative (PRISMA). The results of the primary studies, obtained through a systematic and reproducible methodology, were presented qualitatively and quantitatively (Figure 1).

2.6. Quality Evaluation. In selecting articles for this review, we conducted a quality analysis using the criteria of the EPHPP tool [27]. This tool assigns an overall quality rating to each study based on the assessment of six key components. Studies are rated as “strong” if they have no weak components and at least four strong ones. Those with fewer than four strong components and one weak component are deemed as “moderate.” Studies receiving two or more weak component ratings are categorized as “weak” [27].

TABLE 1: Characteristics of the studies included in the systematic review.

Author (year) country (reference)	Study design	Comparisons	Objectives of the study	Participants	Measured variable and scale	Interventions	Results
Raphaelis, et al. (2018), Switzerland, Austria [15]	Longitudinal, multicentre, randomized phase 2 study	Written information group and counselling group with an advanced practice nurse	To determine whether written information and/or counselling reduces disease-related uncertainty in women with vulvar neoplasia	N = 49 women with vulvar neoplasia from four Swiss hospitals and one Austrian hospital	The German adult form of the Mishel uncertainty of illness scale (MUJIS-A)	Written: two booklets during the time from diagnosis to surgery. Counselling: five consultations with APN for 10–50 minutes	Overall, the counselling group showed a better trend of improvement on all uncertainty scales throughout the study. Within the counselling group, uncertainty, ambiguity, inconsistency, and unpredictability decreased significantly over six months
Westman et al. (2019), Sweden [16]	Cross-sectional study including two cohorts of patients	All patients with gynecological, hematological, head and neck CA and upper GI before and after the intervention of a new nursing figure in a region of Sweden	To compare patients’ perceptions of care before and after the introduction of a new advanced nursing role, the coordinating contact nurse (CCN), in a region of Sweden	N = 1872 [patients with gynecological (n = 598), hematological (n = 461), upper gastrointestinal (n = 418) and head and neck cancers (n = 395)]	The validated Swedish versions of the European Organization for Research and Treatment of Cancer (EORTC) quality of life questionnaire, QLQ-C30 and QLQ-INFO25, and also a study-specific questionnaire	Interventions were carried out by the new nursing staff. Data were collected in April–May 2015 (baseline) and April–May 2017 (follow-up)	In relation to health-related patient information (overall mean EORTC QLQ- INFO25 score increased from 41.23 to 44.16, $p = 0.0006$), statistically significant improvements were found related to the availability of supportive care resources, e.g., increased informed access to the contact nurse and individual written care plans

TABLE 1: Continued.

Author (year) country (reference)	Study design	Comparisons	Objectives of the study	Participants	Measured variable and scale	Interventions	Results
Serra-barril et al. (2023), Spain [17]	Qualitative phenomenological study	A group of patients and a multidisciplinary group of professionals	To know the lived experience of cancer patients and multidisciplinary professionals in relation to the care provided by the advanced practice nurse	18 professionals and 11 patients	Experiences related to advanced practice nurse, most relevant functions/ characteristics/care offered by this figure, benefits of the care provided, and most relevant aspects of care. The instrument used was self-developed interviews	The study took place from March to December 2021 in four highly complex public university hospitals in Catalonia. Individual interviews with professionals (45–60 minutes each) were conducted online from March to May 2021, using the Microsoft teams platform. From October to December 2021, patient interviews were conducted in person, in a quiet and comfortable hospital room, and lasted approximately 30–45 min	Advanced practice nurses play a critical role in cancer care, making positive contributions to the patient experience and to the work of the multidisciplinary team
Serena et al. (2018), Switzerland [18]	Qualitative descriptive	A multidisciplinary group of professionals and a group of patients	To explore the acceptance of a new role, the advanced practice lung cancer nurse (APNLC), from the perspective of patients and healthcare professionals in a country that lacks regulatory oversight of advanced practice nurse (APN) roles	Multidisciplinary healthcare team, including physicians ($n = 6$), oncology nurses ($n = 5$), the social worker, and the APNLC. Patients ($n = 4$)	The measurement variables were identification of the role of the CLNPA, specific contributions of the role of the CLNPA, and flexibility of the CLNPA service. Semistructured interviews with self-developed items and a self-developed guide for conducting focus group discussions were used for this purpose	Two focus group discussions were conducted with members who had worked closely during the last 6 months with the ANPLC: G1 nurses and social workers and G2 physicians. Semistructured interviews were conducted for ANPLC and patients (lung cancer patients who had received care from ANPLC)	Three main themes were found: identification of the role of the CLNPA, specific contributions of the role of the CLNPA, and flexible service of the CLNPA. Clinicians and patients clearly recognized the role of the CLNPA, noting contributions to continuity of care, psychosocial support, and facilitation of self-management of symptoms

TABLE 1: Continued.

Author (year) country (reference)	Study design	Comparisons	Objectives of the study	Participants	Measured variable and scale	Interventions	Results
Schneider, Kempfer, and Backes (2021) Brazil [19]	Systematic review	—	Seeking evidence on the education of advanced practice nurses through clinical practice and nursing care with cancer patients	A total of 12 experimental studies were identified	The variables that the studies had to address were educational guidance, control of pain or other symptoms related to the disease and/or treatment, and satisfaction and improvement in the quality of life of cancer patients. All of them in studies in which advanced practice nurses had been involved	The searches were carried out in the following electronic data: PubMed, LILACS, Institute for Scientific Information (ISI) Web of Knowledge via Web of Science, Scopus, CINAHL-EBSCO, and Cochrane Central Register of Controlled Trials (CENTRAL). The timeframe was from 15 July 2018 to 15 December 2019	The analysis of these studies showed that advanced practice nurses were adequately trained. This fact was objectified through the conclusions of the experimental studies analyzed, since, through the good practice of advanced practice nurses, an improvement in the control of pain or other symptoms related to the disease and/or the treatment, satisfaction, and improvement in the quality of life of cancer patients was identified
Muñoz et al. (2023), Spain [20]	Cross-sectional, descriptive study with a quantitative approach	Intervention without a control group	To identify the competency profile of advanced practice nurses involved in the care process of oncology patients	N = 35 nurses caring for cancer patients at the Hospital del Mar, Barcelona	The variables analyzed were the educational standards required by ICN for advanced practice nurse and postgraduate academic qualifications. The instrument for defining the role of the advanced practice nurse (IDREPA) was used	The data were recorded between February and March 2021 through the completion of the instrument by the professionals	Nine (31%) nurses were identified as meeting the standard in all 6 domains on the IDREPA scale to be considered as advanced practice nurses. Of these 9, 31% met the educational standards required by ICN, 7 (24.1%) with an official master's degree and 2 (6.9%) with a doctorate

TABLE 1: Continued.

Author (year) country (reference)	Study design	Comparisons	Objectives of the study	Participants	Measured variable and scale	Interventions	Results
Geese et al. (2020), Switzerland [21]	Qualitative analysis study	A single experimental group with two subgroups, one of the patients and one of the relatives of patients	To explore the experience of prostate cancer patients undergoing radical prostatectomy and their partners from diagnosis through to follow-up care and the APN support program	$N = 18$ participants, patients ($n = 10$) spouses ($n = 8$)	The study variables were perceptions of empathetic, trusting, informed, open behaviours, and quality of information received in terms of diagnoses and symptoms, offered by the advanced practice nurse. A series of self-developed semistructured interviews were used as an instrument	Between September 2015 and January 2016, 10 patients with PCa and eight spouses agreed to participate in the study. A series of semistructured interviews were conducted to explore patients' and their partners' experiences from diagnosis to discharge	Patients appreciated the EPA's support program. They noted that the EPA was empathetic, trustworthy, knowledgeable, and open. Patients received specific information about PCa, including related symptoms and postoperative side effects
Alotaibi and Al anizi, (2020), Saudi Arabia [22]	Systematic review	—	To determine how advanced practice nurses (APNs) can contribute to cancer care	$N = 5$ items that met the established criteria	The variables taken into account in this work were support for elderly patients, stress relief, improvement of quality of life, and help in symptom management	A series of systematic searches of research studies conducted from 2005 to 2018 were carried out in the following databases: MEDLINE, CINAHL, PubMed, and AMED	The selected studies showed that EPAs provide support to elderly patients, which helps to relieve stress and improve the quality of life of cancer patients. In addition, it was found that EPAs can help patients with symptom management

TABLE 1: Continued.

Author (year) country (reference)	Study design	Comparisons	Objectives of the study	Participants	Measured variable and scale	Interventions	Results
Kim and Yoo (2022), South Korea [23]	Quasiexperimental study with a pretest-posttest nonequivalent control group	Experimental and control groups	To investigate the effects of an advanced practice nurse-led psychoeducational program on distress, anxiety, depression, cancer coping, health-promoting behaviour, and quality of life among colorectal cancer survivors	N = 39. 19 in the experimental group and 20 in the control group	Distress, anxiety, depression, cancer coping, health promotion, and QOL (quality of life) were investigated	A psychoeducational program was implemented by an advanced practice nurse. The program included interventions on anxiety, depression, distress, coping and health-promoting behaviours, and quality of life. Variables were measured before, immediately after, and 4 weeks after the intervention	The psychoeducation program had a positive effect on reducing stress and anxiety in colorectal cancer survivors, improving their coping with cancer and their quality of life
Morgan et al. (2016), USA [24]	Bibliographic review article	—	Describe how the advanced practice nurse (APN) is uniquely suited to meet the needs of older adults across the cancer continuum	N = 82. The information detailed in this paper is based on 82 articles found in searchable databases	Cancer care through: (1) preventive care, screening, and early diagnosis; (2) oncology and gerontology-specific care in geriatric oncology clinics and beyond; and (3) throughout survivorship	A series of searches were carried out in the following databases: Google Scholar, PubMed, and CINAHL. Search terms included the following: "Gero-oncology," "geriatric oncology," "advanced practice nurse," "nurse practitioner," "older adult," "elderly," and "cancer". The papers included in this review range from 2002 to 2015	APNs have made great strides in the care of older adults with cancer through prevention, screening and diagnosis, evidence-based geriatric oncology, and throughout the disease process and are well positioned to help understand the complex relationship between risk factors, geriatric syndromes, and frailty and translate research into practice

The findings of this analysis are shown in Table 2. Of the various articles analyzed, 14% had a strong overall score [23], 57% a moderate overall score [15, 16, 20, 21], and 29% a weak overall score [17, 18].

However, although the percentage of strong scores was the lowest proportion, all papers had strong internal components compared to the percentage of participants who made it to the end of the intervention. In addition, most studies showed strength in terms of the instruments used for data collection and the risk of bias [15, 16, 20, 23]. These internal components with a strong score are relevant and can be prioritized with respect to others, as they are more closely related to the objective of the study in this systematic review. Therefore, although the presence of other internal components with weak or moderate score is evident, since the most relevant internal components were strong, all these studies were included in this research. Another aspect to highlight is that the studies with a moderate overall score only presented one weak internal component out of the six evaluated [15, 16, 20, 21]. Similarly, those with a weak overall score had only two weak internal components [17, 18].

3. Results

3.1. Selection of Studies and the Data Extraction Process. After conducting a comprehensive search and applying the controlled terms (DeCS and MeSH) together with Boolean operators as specified in the search strategy, a total of 1306 relevant articles were collected. The first search was conducted in Web of Science (WoS), where 74 articles were found; the second search was conducted in the Scopus database, gathering a sum of 62 articles; the third search was conducted in PubMed, obtaining a total of 10 articles; subsequently, different searches were conducted in ScienceDirect, CINAHL, and LILACS, obtaining a total of 906, 143, and 111 studies, respectively. Eight duplicate articles were eliminated, resulting in a total of 1298 papers.

The criteria detailed in the data extraction were applied. The first level of screening involved examining the titles and abstracts of articles in all databases, retaining those that looked promising for a full-text review. This stage left a pool of 58 articles for further analysis.

Subsequently, inclusion and exclusion criteria were applied to these 58 articles, resulting in the elimination of 48 of them. The reasons for excluding these 48 articles in the context of this review were based on several considerations: insufficient information ($n = 30$) and insufficient discussion of the topic of APN ($n = 18$).

Finally, after this selection process, a total of 10 articles were identified and retained that met the relevance and quality criteria established for this research. To reduce the selection bias, each article was independently reviewed by three of the researchers (C.U.-G., F.-J.G.-V., and E.C.), who decided whether each article met the criteria. If these researchers did not reach a consensus on the inclusion of a paper, the other two researchers (R.C.-B.; M.-d.-I.-A.M.-G. and E.-M.B.-M.) mediated the decision.

3.2. Characteristics of the Studies: Result Synthesis. Table 1 provides exhaustive details of the main data related to each of the studies included in this review. These data include relevant information such as names of authors, year of publication, country of origin, type of study, comparisons examined, study objectives, participant population, variables considered, measurement instruments used, interventions, and, finally, the results obtained.

Of the ten research articles included in this review, one (10%) was a longitudinal, multicenter, randomized phase 2 study [15]; one (10%) a cross-sectional study involving two cohorts of patients [16]; three (30%) were qualitative studies [17, 18, 21]; two (20%) were systematic reviews [19, 22]; one (10%) a descriptive cross-sectional study with quantitative approach [20]; one (10%) a quasiexperimental study [23]; and one (10%) a literature review study [24].

In terms of the countries in which the work was carried out, three (30%) were carried out in Switzerland [15, 18, 21], one (10%) in Sweden [16], two (20%) in Spain [17, 20], one (10%) in Brazil [19], one (10%) in Saudi Arabia [22], one (10%) in South Korea [23], and one (10%) in the USA [24].

Concerning the area of study topic addressed by the different articles, five (50%) investigated patients' perceptions of the APN [15, 16, 22–24] two (20%) investigated perceptions of both patients and professionals of the multidisciplinary team [18, 20], two (20%) on the adequacy of APN education [19, 20], and one (10%) on perceptions of patients and family members [21].

Regarding the perceptions of APNs in relation to adult oncology patients, satisfactory results were obtained from patients and other professionals in the multidisciplinary team, with direct clinical practice, coordination, consultation, advice, and education being the most important [17]. In addition, the figure of obtaining information and applying advice on self-management of physical symptoms is positively valued [18]. Similarly, relatives of senior oncology patients also showed their appreciation for this professional, which is considered a valuable resource in the counselling about the disease [21].

From the ten studies analyzed, the following conclusions are drawn regarding the role of advanced practice nurses and the adequacy of their training: They play an essential role in assessing and diagnosing the needs of senior oncology patients by performing a comprehensive geriatric assessment. It also collaborates in the promotion of regular cancer screening and detection [24]; plays a crucial role in the early detection of complications and toxicities related to cancer treatment, contributing to a more accurate diagnosis and more effective care planning [17, 22]; contributes to the assessment and diagnosis of the needs of older patients with colorectal cancer by providing a comprehensive assessment of patients' needs, as well as continuity of care, psychosocial support, and facilitation of self-management of symptoms [18, 23]; and promotes care and facilitates the transition process from diagnosis to end of life. It also plays an important role in education and collaboration with multidisciplinary teams [19]; influences the improvement of patient variables such as uncertainty, ambiguity, inconsistency, and unpredictability, and increases the safety and confidence of

TABLE 2: Quality assessment components and ratings for the EPHPP instrument.

Articles	Components**						Overall score*
	1	2	3	4	5	6	
Raphaelis et al. [15]	S	S	M	W	S	S	M
Westman et al. [16]	S	M	M	M	S	S	M
Serra-barril et al. [17]	M	W	S	W	M	S	W
Alotaibi and Al [22]	M	W	M	W	M	S	W
Muñoz et al. [20]	S	W	S	M	S	S	M
Geese et al. [21]	M	M	M	M	W	S	M
Kim et al. [23]	S	S	M	M	S	S	S

*W, weak; M, moderate; S, strong. **1 = risk of bias; 2 = design; 3 = confounding factors; 4 = masking; 5 = data collection; 6 = withdrawals.

patients and relatives [15, 21]; and improves the acquisition of information related to supportive care resources [16]; their training in most cases meets the training standards required by ICN and this is evidenced by their clinical and care practice [19, 20].

3.3. Association between the Different APN Interventions with the Quality of Life of Senior Oncology Patients. APNs prioritize and effectively manage pain, providing vital emotional and psychological support during cancer treatment. Through empathetic communication and family participation, they improve both quality of life and patient ability to self-manage their health [19]. In certain cases, the APNs called patients after initial chemotherapy sessions to assess symptoms and provide advice, addressing both physical and psychological aspects of quality of life. This approach was proven to be more effective than interventions that focus solely on targeting quality of life [16]. Emotional and psychological support, with the use of active listening by APNs, also led to improvements in quality of life through reduced stress and anxiety [16]. Another key element was advance care planning in gerontological end-of-life care. People involved in this type of care are more likely to know and fulfill their wishes at the end of life, which improves patient and family satisfaction [24].

The groups with APN counselling showed a better trend of improvement on all uncertainty scales [15]. On the other hand, the reviewed studies have also shown how APNs can provide support to senior oncology patients through external means. The provision of telephone support facilitated access to the system and provided a rapid response to patients' problems and needs [16, 17]. Finally, it was also observed how APNs can make referrals to support services for patients and their families, such as support groups or counselors and mental health services, as they can identify signs of depression or emotional distress and collaborate with other mental health professionals when necessary. All of this had an impact on improving the quality of life of patients and families [15, 19, 24].

4. Discussion

The aim of this systematic review was to identify research papers that analyzed the impact of APNs on the quality of life of older adults with cancer.

Cancer care has become increasingly complex due to an ageing population and the growing need for comprehensive and personalized approaches to cancer treatment [1]. This review highlights multiple findings that underscore the essential contribution of APNs in enhancing quality of life and providing comprehensive care to senior oncology patients.

APN collaborates with the multidisciplinary team to carry out a comprehensive geriatric assessment, achieving a substantial change in treatment decisions in more than 40% of patients. With the intervention of this professional, great advances in prevention, detection, and diagnosis are achieved [24]. To grasp the significance of this finding, it is essential to appreciate the role of the global geriatric assessment in adults. Older people undergo a transformation in their health, affecting their functional, psychological, and social aspects. A dependable global geriatric assessment that is valid, feasible, and simple aids in diagnosing health problems across all dimensions. It streamlines medical care and improves the overall quality of life for the elderly [28].

Early implementation of palliative care with APN in cancer treatment significantly improves patient's quality of life, reduces depression, and minimizes the need for intensive care. This approach may also contribute to increased survival, as demonstrated in postoperative patients who received home APN intervention compared to those who did not [15, 19]. These findings emphasize the vital role of APNs in end-of-life care, where their advanced clinical decisions and specialized knowledge in cancer care directly contribute to improved quality of life. This ensures that older adults receive optimal treatment, leading to longer survival in most cases [20].

Nurses are increasingly taking on new roles in different countries. Health education is becoming one of its key functions. There is a significant improvement in patients' perception of the health-related information they receive [16]. All this makes a positive contribution to the patient's experience and to the work of the multidisciplinary team [17].

The health education provided by APNs goes beyond providing general information to senior oncology patients. It plays a crucial role in the ongoing dialogue with patients, offering guidance and education on managing reported side effects during medication treatment [18, 29–31]. Similarly, these nurses work closely with social workers, pharmacists, and physicians. This interdisciplinary and coordinated

approach can have a significant impact on the quality of life of senior oncology patients by providing a smoother and more effective transition from the hospital setting to outpatient or home care [16].

On the other hand, it has also been observed that with the intervention of APNs in psychoeducational programs for cancer survivors, their coping improves, as well as their quality of life. This is due to the positive effect on the reduction of stress and anxiety [23]. Patient-centered care, which includes both physical and psychological aspects of quality of life, produces more effective results than interventions that focus solely on quality of life. APNs, with their knowledge and experience, play a crucial role in achieving this, contributing to the reduction of chemotherapy-related symptoms [22, 23]. However, it should be kept in mind that an intervention directed only towards health education is unlikely to lead to a complete behavioural change. To improve the level of behavioural change in senior oncology patients, it is also necessary to implement regular physical activity and dietary practices [32]. Physical activity is an important factor that affects the prognosis and psychosocial adjustment of senior oncology patients [33].

One of the most distressing things for senior oncology patients is the uncertainty they experience. The disease process they are going through has many variables that are completely unknown to them [34]. Raphaelis and collaborators' [15] findings indicate that APN counselling reduces uncertainty related to vulvar neoplasia in adult women. Personalized counselling by APNs showed a significant decrease in uncertainty measures in six months, while written information did not produce significant decreases over time in another group [21]. This corroborates what has already been evidenced in other research, where participants stated that APNs were a key point of support: people who were there for any concerns that were difficult to discuss with a social network or other healthcare providers [35].

In terms of perception of the multidisciplinary team, Serena and collaborators [18] detailed promising results in their research. Physicians perceived APNs as adding value in facilitating access to care, supporting symptom management, providing psychosocial support, and improving continuity of care [18]. These results are consistent with other studies, which emphasize the concurrent empowerment of medicine and nursing. The specialization of nursing roles, such as APNs, contributes significantly to the overarching goal of healthcare, improving patient well-being. Medical professionals recognize and value this nursing role as a valuable complement to their clinical work [36].

Families' perceptions of the APNs were also identified in several studies as favorable [18, 21]. Families noted that, after the intervention, they and their ill relatives received targeted information about cancer, its symptoms, and side effects. In addition, APNs referred them to support services, including self-help groups, sex therapy, and psycho-oncology [18]. However, despite the results, Hart and colleagues [37] estimated in their study that only 65% of patients were willing to be seen by an APN for the first time.

All the scientific literature reviewed agrees that it is necessary to provide individualized, multidimensional and multidisciplinary care to senior oncology patients. For this, the figure of APNs is fundamental, as it is a specialization that requires formal training and education [38, 39]. Currently, there are multiple training initiatives in Spain, such as organizing symposiums, conferences, and courses, although it would still be necessary to include this training and specialization in the curricular training of both geriatric nurses and oncology specialists [9].

This study has limitations, including the heterogeneity of incorporated works due to methodological variations, participant characteristics, intervention specifics, and outcomes. It is difficult to extrapolate conclusions with qualitative studies or systematic reviews; however, in this research, there are also several studies with a control group, a cohort study, and a randomized study, which present greater control of bias [40] and therefore the possibility of extrapolating their conclusions. Despite these limitations, the research addresses a contemporary question in the context of recent global challenges, especially the pandemic. There is a scarcity of studies on the influence of APNs on the quality of life of cancer patient's postpandemic, making this investigation novel. Furthermore, it is a work in which the PRISMA declaration criteria [13] for systematic reviews have been rigorously followed through the exhaustive analysis of the selected articles. However, future research with various interventions and randomized trial designs by APNs is recommended to further advance knowledge in this area, taking into consideration a greater margin of years regarding the publication date for database searches. It would also be appropriate in future research to carry out a meta-analysis after making the systematic review.

5. Conclusions

Carrying out systematic reviews such as those in this study is a challenge due to the lack of recognition that currently exists for these professionals. However, the evidence reflected represents relevant conclusions for the profession in particular and for public health in general.

APNs play a crucial role in the care of older adults with cancer, significantly improving their quality of life and contributing to comprehensive patient care. The research conclusions in this review highlight various aspects of the work of APNs in oncological care for the elderly, including comprehensive geriatric assessment, early detection of complications, personalized care planning, emotional support, educational guidance for patients and families, and vital collaboration within multidisciplinary teams. It is evident that advanced practice nurse (APN) is an emerging practice that improves the care of older people.

In summary, the findings presented in this paper endorse the inclusion of APNs in oncology care teams for a better patient experience and overall well-being. It is crucial to acknowledge and appreciate the significant contribution of APNs in oncology. Advocacy for greater recognition and regulation of its role in the care of senior oncology patients, along with its participation in clinical trials, is essential. The

work of APNs not only enhances the quality of life of these patients but also positively influences clinical outcomes and the health workforce.

6. Implications to Nursing Management

The study highlights the critical role of advanced practice nurses (APNs) in enhancing the care of senior oncology patients, suggesting significant implications for nursing management and leadership. APNs lead multidisciplinary teams effectively, advocating for shared leadership to improve decision-making and care execution. Nursing management should leverage APN expertise in policy advocacy, particularly in expanding their roles within oncology, which is essential for enhancing patient care and operational efficiency.

APNs' ability to manage early complications and provide personalized care underscores the need for ongoing professional development and involvement in quality control measures. Nursing leaders should prioritize continuous education for APNs and empower them to initiate care plan adjustments, ensuring high standards of patient safety and care quality.

Furthermore, establishing robust feedback mechanisms for APNs can enhance the effectiveness of nursing practices. This feedback is crucial for refining patient care strategies and advancing nursing leadership, aligning with the goals of improving clinical outcomes and the overall patient experience in healthcare settings.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Emotional Intelligence among Female Nursing Leaders in a Transformational Era

Noura Almadani ¹ and Majed Alamri ²

¹Community and Psychiatric Mental Health Nursing Department, College of Nursing, Princess Nourah bint Abdulrahman University, Riyadh 84428, Saudi Arabia

²Nursing Department, College of Applied Medical Sciences, University of Hafr Al Batin, Hafar Al Batin 39524, Saudi Arabia

Correspondence should be addressed to Majed Alamri; m.alamri@uhb.edu.sa

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Background. Emotional intelligence (EI) is an instrumental quality for effective management in the changing landscape of healthcare leadership, specifically among female nursing leaders. **Aim.** This study aims to assess the EI among female nursing leaders in Saudi Arabian hospitals and to examine its connection with leadership and effectiveness of decision-making during a transformational period. **Methods.** This study applied a correlational descriptive cross-sectional methodology to gather data from 232 female nursing leaders. The data were collected via an online survey using convenience sampling. The study incorporated demographic data as well as a 16-item EI scale. Approval was granted by the ethics committee, and the participants' privacy was appropriately ensured. **Results.** The majority of the participants were experienced professionals aged 25 years and above, with a significant proportion holding a bachelor's degree or higher, and over five years of leadership experience. The study revealed a positive connection between EI and self-leadership (self-awareness, self-reflection, and self-motivation), especially among leaders with more experience. An investigation considering many variables revealed a noteworthy model that explains 55.2% of the variation in EI scores. This model portrays that higher self-leadership scores, as well as longer experience, are predictors of higher levels of EI. **Conclusions.** This study has found that EI is widespread among female nursing leaders, and it is meaningfully and positively associated with their aptitude for self-leadership. The fact that more leadership experience correlated with higher EI signifies the need for focused EI development programs in the nursing leadership curriculum. These insights are instrumental for developing leadership that can effectually manage the intricacies of the evolving healthcare transition.

1. Introduction

All nurse leaders must possess a comprehensive range of skills to effectively lead in this transformational era [1]. The transformational era of healthcare refers to a period of significant changes and advances in the industry, such as technological advances, new treatment modalities, and shifting patient demographics [2]. Emotional intelligence (EI) is particularly important for female nursing leaders in this era as it equips them with the skills to navigate these changes, inspire their teams, and foster a culture of continuous learning and growth. By incorporating EI into their mindset, female nursing leaders can effectively lead their teams through the challenges and complexities of healthcare

transformation, ultimately ensuring the delivery of high-quality patient care and to maintain a positive work environment [2]. To be effective, it is essential for female nursing leaders to be aware of their emotions and manage them. Female nursing leaders often face unique challenges in the workplace, such as gender-based discrimination and pay inequality [3].

As a result, it is important for female nursing leaders to be aware of their own emotions to manage their stress and stay emotionally healthy [1]. By understanding their emotions, female nursing leaders can develop strong coping strategies and be better equipped to navigate the challenges they may face in the workplace. This awareness of their emotions can also help to better empathize with and support

their colleagues, regardless of gender. Moreover, the literature supports that EI has significant influence on authentic leadership [4]. EI stems from the concept of social intelligence, which refers to the ability to understand and influence other people [5].

For instance, a female leader with high EI would recognize when a team member is feeling overwhelmed and provide support to that team member rather than reprimanding them for not achieving a goal. In addition, several studies have demonstrated that EI can also be used to foster team spirit, create a culture of mutual respect and trust, manage staff effectively, and make decisions based on empathy and understanding [4]. Female leaders tend to have a stronger awareness of their emotions and are better able to recognize and empathize with their colleagues' emotions. This often leads to better communication and problem-solving skills, which can be beneficial when working with male colleagues. In addition, females may be more likely to offer emotional support and be more understanding of their colleagues' needs [5]. EI analogous to a compass that guides decisions and actions, helping leaders to stay on course and guide the team in achieving its goals.

Gender and leadership have, in recent times, been at the center of controversy [6]. As more females occupy leadership roles in many countries, questions arise as to whether they should lead in specific areas and whether both males and females exhibit similar leadership traits [7].

The literature shows that gender differences do exist and affect leadership roles in certain circumstances [5, 6]. For example, a report by the Pew Research Center indicates that females only account for 24% of the total members of national legislative bodies globally [8].

Furthermore, a meta-analysis by Lopez-Zafra et al. on transformational leadership, EI, and gender stereotypes revealed that females exhibited higher charisma, transformational characters, and EI skills than males, despite traditional stereotypes of females in leadership [5]. For example, women are often stereotyped as not aggressive enough for leadership positions. They are viewed as caregivers, where men are viewed as assertive. According to a recent report, the unemployment rate for Saudi females has declined to 15.4% in the fourth quarter of 2022 from 2021, 2020, and 2019, with the leading indicators of the Women's Labor Force Survey showing a marked improvement [9]. The percentage of employed females increased to 30.4% from 27.6% in the fourth quarter of 2021, due to the decline in female unemployment, the expansion of their economic participation, and the growth of their employment in a variety of fields. It increased slightly from 35.6% in the fourth quarter of 2021 to 36% in the fourth quarter of 2022 [9]. Leadership styles are essential variables that may explain gender differences in leadership. Different leadership styles require different skillsets, and females may be more likely to have the necessary skills to lead effectively [4, 5]. For example, females may be more likely to have empathy and interpersonal skills, which are important in leading a team. In addition, females may be more likely to make decisions based on the best interests of the team rather than on

personal gain. Yet, different leadership styles may require different skills, such as the ability to motivate and inspire others [5], which are typically associated with males. Females who are successful in leadership roles may have developed these skills through different experiences and methods than males.

An effective leadership style includes demonstrating higher EI. EI influences an individual's establishment as a role model, which helps to gain the trust of team members [4]. EI is an inherent attribute, regardless of gender or sex. However, the level of EI varies among individuals and can often be the difference between influential leaders and less successful ones. Multiple studies show that females score higher than males in EI and are generally more expressive than males [3, 5]. This means that females tend to be more supportive and can effectively manage emotions. Characteristics such as femininity and emotional clarity are essential predictors for transformational leadership [5]. Emotional clarity, specifically, is an important predictor of intellectual stimulation and inspirational charisma in the workplace. Emotional clarity is the ability to identify, understand, and communicate emotions accurately and effectively. It involves self-awareness, self-regulation, and self-expression and is an important skill for leaders to be successful [6, 7].

According to the literature, EI has become a key characteristic of female nursing leaders in the current healthcare transformation landscape [8, 9]. The purpose of this study is to assess the EI of female nursing leaders in the healthcare sector. The results of the study provide insight into how EI can be improved among female nursing leaders to foster better decision-making and enhance leadership skills. As a result of strengthening these skills, patient care and outcomes are likely to improve.

2. Methods

2.1. Study Design and Participants. A correlational descriptive cross-sectional design was conducted using online survey questionnaires.

2.2. Sampling and Data Collection. A total of 232 female nursing leaders working in government and nongovernment hospitals in Saudi Arabia were selected using convenience sampling. Using power analysis to determine the sample size to achieve a significance level of 0.05 and power of 0.80, the minimum requirement was 143 subjects. Data were collected through the online survey questionnaires and the responses were confidential. The survey questionnaires were designed to be short and easy to complete to encourage participation.

2.3. Eligibility and Exclusion Criteria. A nurse with a leadership experience of five years or more (head/charge or equivalent, administrator or equivalent, and supervisor or equivalent) was eligible to participate in the study. Nurses without leadership experience and male nurses were excluded.

2.4. Instruments/Measurements. To gather information to assess the EI among female nursing leaders in the healthcare sector during the transformation era, the Wong and Law Emotional Intelligence Scale (WLEIS) five-point Likert scale with categories of 1–5 (1 = strongly disagree; 5 = strongly agree) was used in this study [10]. The WLEIS contains 16 items based on the ability model. It has four dimensions: self-emotional appraisal, other emotional appraisal, using emotions, and regulating emotions. The total EI score is equal to the mean of the items 1–16. The total self-emotions appraisal is based on the mean of items 1–4. The total regulation of emotions is equal to the mean of items 5–8. Total use of emotion is equal to mean of items 9–12. Total others emotion appraisal is equal to the mean of items 13–16. Increased levels of EI correspond to higher scores on the scale. The scale's factor loadings represent different sub-constructs of EI, and each factor has items that measure specific facets of EI. The correct interpretation of scores calls for the reflection of the highest and lowest possible scores on the scale and the knowledge of the meanings of each factor loading [10]. This measure has been cited over 1300 times by Google Scholar citation searches, demonstrating its popularity among researchers [11]. Based on an earlier study conducted in Saudi Arabia, the final scale had an overall Cronbach's alpha of 0.81, adequate construct validity, and a high content validity index, which indicates excellent internal consistency [12]. There was also a section on demographic characteristics including age, nationality, years of experience, level of education, work experience, workplace, sector, current position, and training courses in the past year.

2.5. Statistical Analysis. The statistical data were coded and entered into the statistical package of social science (SPSS), version 23. Descriptive statistics were generated for all study variables. Pearson correlations, polyserial correlations, and regression analysis were computed to examine the intercorrelations among study variables.

2.6. Ethical Considerations. Ethical approval for this study was obtained from the Institutional Research Ethics Committees (IRB number: HAP-01-R-059). Written consent from study subjects was obtained. Confidentiality of the data and privacy of the study subjects was maintained. Subjects were assured they had the right to withdraw from the study.

3. Results

3.1. Participants' Characteristics. A total of 232 female nursing leaders completed the survey; their demographic characteristics are summarized in Table 1. The majority of participants were aged 25 years and above (88.8%). Majority were Saudi nationals (64.2%) and had more than 5 years of leadership experience (61.6%). A majority of the participants held a bachelor's degree or higher (85.4%). Participants had a variety of workplace expertise. A majority of the participants did not provide a specific designation, choosing the option of "others" (52.2%). A majority of the participants

TABLE 1: Characteristics of female nursing leaders in transformational era.

Characteristics	Mean ± SD/number (percentage)
Age (in years)	
<25 years	26 (11.2%)
25–35 years	94 (40.5%)
36–45 years	73 (31.5%)
>45 years	39 (16.8%)
Nationality	
Saudi	149 (64.2%)
Expatriates	83 (35.8%)
Years of experience	
<5 years	89 (38.4%)
6–15 years	53 (22.8%)
16–25 years	25 (10.8%)
>25 years	65 (28.0%)
Educational level	
Diploma/ADN	34 (14.7%)
Bachelor's degree	126 (54.3%)
Master's degree	41 (17.7%)
Doctoral degree	31 (13.4%)
Workplace	
Coronary care unit	2 (0.9%)
Education	35 (15.1%)
Emergency	28 (12.1%)
Intensive care unit	38 (16.4%)
Medical	26 (11.2%)
Other	81 (34.9%)
Pediatric	6 (2.6%)
Surgical	16 (6.9%)
Current position	
Administrator (or equivalent)	44 (19.0%)
Head/charge (or equivalent)	47 (20.3%)
Others	121 (52.2%)
Supervisor (or equivalent)	20 (8.6%)
Self-development courses in last 12 months	
No	61 (26.3%)
Yes	171 (73.7%)
Work sector	
Government hospitals	187 (80.6%)
Other government sectors	14 (6.0%)
Private	31 (13.4%)

SD: standard deviation.

had taken self-development courses in the previous year (73.7%) and a majority worked in the government sector (80.6%).

3.2. EI and Its Factor Scores in Female Nursing Leaders. The mean values of EI total score and factor scores of self-emotions appraisal, regulation of emotions, use of emotion, and other emotions appraisal were 4.00 ± 0.56 ; 4.03 ± 0.69 ; 4.03 ± 0.71 ; 4.12 ± 0.65 ; and 3.84 ± 0.70 , respectively (Table 2). These results suggest that participants generally had moderate to high levels of EI, as indicated by the mean scores falling within the four-point range. The highest mean score was observed for the factor of regulation of emotions, indicating that participants were particularly skilled at managing and controlling their emotions. In addition, the high

TABLE 2: Emotional intelligence and its factor scores in female nursing leaders.

	Minimum	Maximum	Mean	SD
Total self-emotions appraisal	1.00	5.00	4.03	0.690
Total regulation of emotions	1.00	5.00	4.033	0.709
Total use of emotion	1.00	5.00	4.123	0.649
Total other -emotion appraisal	1.25	5.00	3.843	0.699
Total emotional intelligence	1.13	5.00	4.003	0.559
Valid N (listwise)				

SD: standard deviation.

standard deviations indicate variability in the participants' responses, highlighting individual differences in EI within the study cohort.

3.3. Self-Leadership Scale and Its Factor Scores in Female Nursing Leaders. The mean values of self-leadership scale total score and factor scores of behavior awareness and volition, task motivation, and constructive cognition were 36.67 ± 4.93 ; 12.65 ± 1.87 ; 11.99 ± 2.05 ; and 12.03 ± 1.94 ; respectively (Table 3). These findings suggest that, on average, participants had moderate levels of self-leadership, with higher scores in behavior awareness and volition. Task motivation and constructive cognition scores were also relatively high, indicating a strong sense of motivation and cognitive strategies for self-leadership among the participants.

3.4. Multivariate Analysis: Multiple Linear Regression-Associated Factors of EI. The multiple regression model was statistically significant, $F(17, 217) = 17.451$, $p < 0.001$, $R^2 = 0.552$ (Table 4). For every unit change in the self-leadership score, the EI level increased by 0.72 ($p < 0.001$). The highest level of experience category (>25 years) showed a higher level of EI 0.205 ($p = 0.021$). These findings indicate a significant positive relationship between self-leadership and EI, with a 0.72 increase in EI for every unit change in the self-leadership score. Furthermore, the highest level of experience category (>25 years) was associated with a statistically significant higher level of EI, suggesting that years of experience may contribute to higher levels of EI. These results highlight the importance of self-leadership and experience in fostering EI.

4. Discussion

The findings of this study demonstrate the interconnected nature of EI among nursing leaders during a transformation period. It is indicated that female nursing leaders who have high EI scores have great potential to be effective leaders since they are likely to practice EI in their leadership style. Subsequently, EI leadership guides the formation of highly cohesive groups. There is an abundance of empirical findings supporting the relationship between EI and effective leadership styles [1, 4, 5, 10, 13]. The study findings clarified this association. Specifically, there are two key components of EI: emotional clarity and emotional regulation. For example, the findings indicate that female

nursing leaders who are aware of their team members' emotions are better leaders because they promote optimal participation by the team members.

According to research by Mysirlaki and Paraskeva, females demonstrate EI in their leadership more than males [14]. Furthermore, individuals with higher EI are more likely to adopt an effective leadership style that is required in the current transformational era [14, 15]. Yet, a study has shown that females tend to possess higher levels of EI than males, making them more attuned to the emotions and needs of others [16]. This heightened EI can greatly benefit female nursing leaders in healthcare, allowing them to effectively connect with and support their teams, as well as navigate the complex and evolving challenges of the organization. These findings help explain the evidenced higher levels of EI among female nursing leaders who were subjects in this study. The correlation between higher levels of EI and nursing leadership is underlined by the four elements of leadership styles, which include idealized influence, inspirational motivation, intellectual stimulation, and individual consideration. These elements collectively contribute to the effectiveness of leaders who possess high EI [17].

Nursing leaders are required to demonstrate to their staff that they are hands-on in the directives they propose [18]. This attribute encourages commitment among the team and allows nursing leaders to put their advocacy into practice. In this transformative era, female leaders need to demonstrate idealized influence whereby they act as exemplary role models. This approach to leadership means acting as a role model—a strategy that further contributes to higher levels of trust and confidence from the rest of the team [17–20]. An emotional relationship created between the leader and the team because the leader applies emotional support and spreading their individual emotions concerning how they expect their followers to behave. A mutual scenario of emotional manifestation is also created, such that the followers also demonstrate emotional commitment that fosters collaboration in a team [18, 19].

EI also helps nursing leaders demonstrate certain nonverbal emotional cues that create the perception of a charismatic and effective leader. For instance, simple cues such as eye contact go a long way in establishing healthy working relations between a leader and the team [1, 4]. One of the scores' findings that demonstrated effective teamwork and collaboration in the study participants was "others emotion appraisal." As the participants achieved high scores in this category, one can infer better levels of interpersonal functioning because these nursing leaders are likely to

TABLE 3: Self-leadership questionnaire and its factor scores in female nursing leaders.

	Minimum	Maximum	Mean	SD
Behavior awareness and volition	4.00	15.00	12.65	1.87
Task motivation	3.00	15.00	11.99	2.05
Constructive cognition	3.00	15.00	12.03	1.94
Total score	14.00	45.00	36.67	4.93

SD: standard deviation.

TABLE 4: Multiple regression predictors of the emotional level in female nursing leaders.

Independent variable	β	SE	<i>T</i> values	<i>p</i> values	Model unadjusted <i>R</i> ² ; adjusted <i>R</i> ² ; <i>p</i> value
Self-leadership score	0.720	0.005	14.939	<0.001	0.586, 0.552, <0.001
Age categories					
Age: <25 years	Ref				
Age: 25–35 years	0.145	0.102	1.599	0.111	
Age: 36–45 years	0.057	0.128	0.529	0.597	
Age: >45 years	–0.108	0.165	–0.956	0.340	
Highest education level					
Diploma/ADN					
Bachelor's degree	–0.034	0.078	–0.482	0.630	
Master's degree	0.009	0.090	0.140	0.889	
Doctoral degree	–0.077	0.112	–1.138	0.257	
Nationality					
Saudi	Ref				
Expatriates	0.091	0.067	1.562	0.120	
Experience in years					
Less than 5 years	Ref				
6–15 years	0.011	0.084	0.153	0.879	
16–25 years	0.076	0.117	0.848	0.397	
>25 years	0.205	0.155	2.332	0.021	
Current position					
Other	Ref				
Head/charge (or equivalent)	0.027	0.069	0.536	0.592	
Administrator (or equivalent)	–0.071	0.080	–1.266	0.207	
Supervisor (or equivalent)	0.071	0.096	1.443	0.151	
Self-development courses in the last 12 months					
No	Ref				
Yes	0.043	0.062	0.882	0.379	
Work sector					
Private	Ref				
Other government organizations	–0.006	0.127	–0.111	0.912	
Government hospitals	0.015	0.075	0.281	0.779	
Intercept	0.851*	0.227	3.741	<0.001	

*Unstandardized coefficient for intercept, for all other independent variables standardized beta coefficient are shown. SE: standard error.

display appropriate reactions to the various personalities on the team. By understanding and tailoring reactions to the different emotional presentations that various individuals demonstrate, a nursing leader generates the emotional knowledge of how to gain optimum productivity and cooperation from staff members [10].

Effective female nursing leadership includes streamlining the staff toward attaining a common goal. This involves monitoring not only the usual protocol measures but also challenging scenarios, such as change implementation [10–12]. During change implementation, a significant number of staff may demonstrate resistance to change, which can lead to frustration and negative emotions on the

part of the leader. Even so, nursing leaders realize that attaining their envisioned goal requires optimum input from every stakeholder. Such challenging scenarios are significant determinants of a nursing leader's ability to maintain optimum functionality amid stressful conditions, which is why emotional regulation is a significant attribute of a successful leader [12–15].

EI can assist nursing leaders navigate the challenges of implementing change and working under pressure. Leaders with EI create a work environment marked by enthusiasm and flexibility, which, ultimately, supports their key goal of implementing innovation and optimizing productivity [13]. Such leaders are better equipped to create this work

environment because they have immersed themselves in the activities they are proposing to their team. This scenario was evident in the study as the female nursing leaders achieved high scores of self-leadership. An ability such as this implies that the leader proposes expectations on which she can also deliver and understands if some members of the team find the challenge difficult to achieve.

EI is an integral aspect of maintaining group cohesiveness so that members work toward a common goal despite individual differences [13–15]. Building group cohesiveness, therefore, leads to high levels of individual and team engagement. There is an abundance of the literature demonstrating improved performance and relationships among cohesive groups [16]. Members of a cohesive team also display higher satisfaction levels with their performance because they feel they have been given the opportunity to provide an optimum contribution to the course of leadership. In the transformative era, leaders achieve this goal when they not only act as role models but also foster intellectual stimulation to the group members [12].

Research on effective leadership styles has demonstrated improved group outcomes when more inclusive leadership styles are employed, as opposed to those that bestow all the power on the leader [12, 13]. It is crucial for a leader to encourage feedback from individual team members as they may have useful insights derived from their specific experiences in their roles [14]. In as much as a leader may hold a vision for a given course, maximum contribution from the rest of the team is necessary to determine the effectiveness with which the goal is realized. Accepting input from team members makes them feel that their contribution is valued [11]. EI allows leaders to fuel individual team members' contribution through task motivation, as indicated by the high scores achieved in the study cohort. One method to attain task motivation is through valuing members' contributions and feedback because this allows members to generate a self-driven desire for intellectual stimulation [12]. As such, the female nursing leader's initial vision becomes the team members' challenge to explore every method of achieving the goal.

EI enables leaders to foster innovation and creativity among the team members because they are free to develop a critical approach toward the status quo and apply problem-solving techniques to challenges [13]. The high scores achieved by the participants' task motivation imply that the cohort possessed the skills necessary to motivate team members toward a given course. Leaders with high task motivation ability demonstrate skills such as active listening, encouraging team members to communicate and participate, adaptability, and being supportive.

Effective leadership skills are among the several clinical competence areas built by experience [13]. As such, transitioning from a novice to an experienced nurse comes with the benefit of progressively gaining competence in leadership. As nurses spend many years in a clinical area, they become better at establishing cohesion and collaboration in the workplace, with a leader's perspective [14].

The study findings showed higher levels of EI in female nursing leaders who had more years of workplace experience (>25 years). The clinical area can be challenging in terms of applying theoretical knowledge in practice. It often takes time to attain practice competence, even for a nurse who demonstrates excellence in theoretical knowledge. The advent of nursing theories such as Patricia Benner's theory of transition from novice to expert nursing provides sufficient proof of the journey a nurse undertakes to attain optimum competence levels in clinical roles [15]. Evidence from studies also demonstrates nurses' improved competence and confidence levels in their clinical skills, such as catheterization, injection, and sample collection [16].

Similarly, the area of nurse leadership is largely built by years of clinical experience. This concept has also introduced the vital role of nurse mentors in fostering professional growth for novice nurses. Nurse mentors aid novice nurses in avoiding specific errors that are common among new graduates [17]. They also provide insightful guidance on strategies of successful nurses in clinical areas such as workflow management, networking, and workplace collaboration [18]. Experience gives nurses hands-on skills with improved efficiency and the confidence to handle even challenging scenarios, such as ethical dilemmas [19]. This evidence implies that nurse leadership skills will also improve progressively with time and experience.

Through the study by Benner, significant findings were discovered that are related to the relationships between years of experience, EI levels, and the demonstration of leadership skills among nurse leaders. It is noteworthy that nurses with at least five years of experience have exhibited more comprehensive nurse leadership competence compared to novice nurses. This remark illustrates the importance of practical experience to develop leadership skills in the nursing field. Nurses with many years of experience are given an opportunity to hone essential skills such as decision-making, communication, and team management, which are key to good leadership. In addition, it was found that nursing leaders with over 25 years of work experience were those who had higher levels of EI. This reveals that prolonged professional tenure contributes to the maturing and perfecting of emotional regulation and awareness skills, which are crucial to successful leadership. The sense that more time is spent in different types of clinical environments and interpersonal relationships increases the EI that nurse leaders with lengthy experience possess. Overall, these findings reinforce the need to pay attention to and utilize the complementary nature of experience, EI development and leadership proficiency in the process of building a cadre of skillful nurse leaders able to lead healthcare organizations through their complexity [20]. For instance, effective communication is a crucial aspect of nurse leadership that helps establish better relationships and succinctly present ideas [21].

More experienced nursing leaders also possess better decision-making and critical thinking skills that enable them to analyze complex situations and evaluate options to

determine the best course of action [22, 23]. Furthermore, having analytical and problem-solving abilities assists seasoned nurses respond to situations more effectively by adopting novel approaches and putting into practice tried-and-true tactics that are supported by data and experience. For example, evidence-based practice is a strategy designed to ensure nurses provide high-quality care [23].

In addition, for experienced nurses, the application of evidence-based practice includes the adoption of leadership styles, qualities, and skills that have evidence indicating quality outcomes. These nurses also have strongly established EI that has been activated by prolonged durations of self-awareness as well as the knowledge of how different people react [24]. There is also strong literature backing the positive impact EI has on effective conflict resolution, team inspiration, and maintaining a supportive work environment [25–27].

Therefore, apart from gaining knowledge on effective leadership strategies, practical experience assists nurses to become great leaders through team management and operational decision-making. In this transformative era, female nursing leaders must acquire skills beyond balancing costs, monitoring productivity, and maintaining high levels of patient and staff satisfaction [28]. They also need to act as role models and influence processes at not only the organizational but national levels as well. A strong nursing leader motivates team members, creates a safe and collaborative work environment, and ultimately boosts morale and job retention [12].

4.1. Limitations. A significant limitation of the study is that the study participants were only selected from Saudi Arabian hospitals. This sampling method represents subjects from a specific region. Considering leadership skills are influenced by factors such as culture, the sampling process may have been biased in this regard. Therefore, the findings cannot be generalized to participants from other regions with different cultural backgrounds. The sample size was also relatively small for the generalizability of the findings to larger settings. Another limitation of the study was that only female participants were included. This prevented a comparison of females to males, as leaders who are just as effective as or more effective than men. This finding would have assisted in demystifying the misconception of the inability of females to lead that has led to leadership stereotyping based on gender.

4.2. Recommendations. To display their mastery of leadership abilities in this transformative period, leaders must receive training in EI. Leaders also must embrace leadership styles that encourage team members. Building EI is an inner motivation that passionate nurses should cultivate since it greatly enhances cohesiveness and participative leadership. There is a need for leaders to not only understand and control their own emotions but also understand other people's emotions. To apply these findings to the clinical setting, hospitals must create EI models that can include specific personality assessments, behavioral evaluations, and other relevant factors to ensure that the chosen leaders

possess the necessary emotional stability for the clinical setting. Hospitals may start putting the results into practice by launching leadership development programs designed specifically for nursing leaders; these programs should emphasize resilience in terms of managing one's own emotions as well as comprehending those of others. To reinforce EI in nursing leaders, hospitals can also develop slogans that frequently remind leaders of the importance of this quality. Examples of such slogans could include "Empathy is Essential," "Lead with Compassion," "Leading with Emotional Intelligence," "Creating a Caring Culture," or "Empowering through Understanding." These slogans can be printed and mounted at strategic locations to serve as vital tools of communication tool to this course.

4.3. Implications to Nursing Management. The research on EI in the transformational era among female nursing leaders has several implications for nursing management. Firstly, it highlights the importance of nurturing EI skills in nurses, as it can positively impact their leadership abilities and the overall quality of patient care. Secondly, it emphasizes the need for healthcare organizations to prioritize the recruitment and development of emotionally intelligent leaders who can effectively navigate the complexities of the healthcare landscape. Lastly, the findings suggest that incorporating EI training into nursing leadership programs can be a valuable investment in enhancing the effectiveness and success of nursing management. By understanding and addressing these implications, nursing management can foster a more inclusive and empowering environment for female leaders, ultimately enhancing the overall quality of patient care.

5. Conclusion

By assessing EI levels in female nursing leaders, this study sought to establish EI as a forerunner to a transformational leadership style. As established from the study's findings, participants showed high levels of manifestation of transformational behavior. It has also been established from the literature that EI is critical in predicting transformational leadership based on the key components of emotional clarity and emotional regulation. The findings have also challenged the common misconception that females are not effective nurse leaders. As established, individual behavior is determined by factors that are not limited to gender but also to other determinants such as environment, personal experiences, culture, and heredity. The study's findings point to the necessity of creating instruments to raise the EI of nursing leaders to achieve transformational leadership. Furthermore, after receiving sufficient training in EI, leaders, male and female alike, can demonstrate EI in their leadership style to achieve greater levels of employee satisfaction and organizational performance.

Data Availability

The data used to support the findings of this study are available from the corresponding authors on request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Evaluation of the Relationship between the Levels of Patience and Tranquillity and Conflict Resolution Styles of Executive Nurses

Ayşe Gumusler Basaran ¹, Bahar Kefeli Col ² and Burcu Genc Kose ³

¹Faculty of Health Science, Recep Tayyip Erdogan University, Rize, Türkiye

²Guneyso Vocational School of Physical Therapy and Rehabilitation, Recep Tayyip Erdogan University, Rize, Türkiye

³Vocational School of Health Services, Recep Tayyip Erdogan University, Rize, Türkiye

Correspondence should be addressed to Ayşe Gumusler Basaran; ayse.basaran@erdogan.edu.tr

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Aims. This study examined nurse managers' conflict resolution styles, tranquillity and patience levels, and their relationships. **Background.** Managers are supposed to know how to manage conflict to reduce the destructive effects of conflict and create constructive effects. **Methods.** The study was a descriptive cross-sectional study and in a city centre in Karadeniz region, in May 2022. It was aimed to reach all executive nurses but was completed with 41 executive nurses. The data were collected face to face using a Sociodemographic Questionnaire, the Rahim Organizational Conflict Inventory, the Patience Scale, and the Tranquillity Scale. **Results.** 51.2% experienced conflict with colleagues and 46.3% with other employees. In conflict management, the most commonly used style was integrating and the least was dominating, respectively. The Patience Scale score (39.15 ± 6.09) and Tranquillity Scale score (3.70 ± 0.70) were moderate. At the same time, long-term (10.19 ± 2.18), short-term (8.90 ± 2.54), and total patience scores were significantly lower in case of conflict with nurses. Interpersonal patience levels were significantly lower in case of conflict with other employees. There was a negative correlation between working as a manager and compromising style. **Conclusion.** It was concluded that executive nurses used the integrating style more, and their patience and tranquillity levels were moderate. In addition to using the integration style more, the fact that nurse managers have moderate levels of patience and calmness will reflect positively on the quality of patient care. It will also increase employee satisfaction. Increasing the level of peace in health institutions will support patience, happiness, and a sense of belonging among employees.

1. Introduction

Conflict is a disagreement or incompatibility between two or more people or groups, a clash of interest, power, and status [1] and occurs when conflicting activities happen [2]. Conflict is a contestation of interests, power, and status between two or more individuals or groups and occurs when conflicting activities occur. The differences in values, ideas, and attitudes, communication and coordination disorders, uncertainties about the management field, and sometimes the poor functioning of the management process can be considered the root causes of conflict in hospitals [1, 3, 4]. Conflict is not always positive or negative; it can signify danger or a harbinger of new opportunities. Whether

conflict outcomes are positive or negative is related to how it is managed [1]. Constructively worked conflict is said to bring about healthy competition, strengthen team participation, and bridge the communication gap [5]. Therefore, conflict management is one of the skills managers require [6].

Conflict resolution is the method used to resolve conflicts in social situations [7]. Different strategies such as integration, obliging, dominating, compromising, and avoiding are used in conflict management. The "integration" strategy adds up to a high interest for self and others, plus involves preciseness, information exchange, and questioning. As for the strategy of "compromising," the individual neglects his self-interest to satisfy the other party's anxiety,

resulting in the situation's characterisation as obedience and compliance with the requests of the opposite party. In addition, it is used when the protection of relations with the other party is more important than the satisfaction of needs. Contrary to the strategy of "integration," "domination" adds up to a high interest for oneself and a low interest for others. The dominant person will do anything to win, resulting in their ignorance of the other party's needs and expectations. Conflict is viable unless it is between the superior and the subordinate, but it can lead to a stalemate when both sides are on equal footing. The "avoiding" strategy involves low interest, both for oneself and others. In other words, an avoidant cannot satisfy both his anxiety and others. Instead of resolving the conflict, postponement can be used to gain time for one of the parties. The "obliging" strategy involves both parties giving up on something to reconcile mutually. Therefore, it is unsuitable for dealing with complex problems requiring a problem-solving approach. However, it is useful when building a consensus is impossible and both parties need a temporary solution to a complex issue [1, 8, 9].

Nurse managers experience conflict daily and are central to conflict management [10]. A study revealed that 61.4% of the nurses in charge of the service had conflicts with the nurses they worked with, most of which were caused by organisational reasons (61.5%) [11]. The leading causes of conflict between physicians and nurses are ambiguity in job descriptions, communication problems, rude and destructive behaviours of physicians, perception of the profession [12], and differences in doctors' demand for power and nurses' demand for influence [13]. In addition, other studies have found moderate to high levels of stress [14–16], job burnout [17], low job satisfaction [15, 18–21], and occupational fatigue [22] in nurses. Factors affecting stress and job satisfaction, such as high workload, shift work and overtime, staff shortage, job uncertainty, workplace violence, and managers' attitude [15, 16, 22–24] can also be considered as factors that cause conflict.

The reasons for the conflict among the executive nurses were affected by variables such as the hospital, age, and professional experience. In addition, the job description and workload caused the conflict [25]. Regarding conflict management, it was determined that the service managers used the integration strategy the most and avoidance the least [11]. Accordingly, nursing students mostly used the strategy of obliging and least domination [26]; in addition, the conflict strategies of university students did not differ according to gender [27]. Different strategies were used to resolve the conflict between doctors and nurses; the most used strategies were integration, compromising, and avoidance, whereas the least used one was dominating [12]. While determining the appropriate strategy in a conflict, considering its contribution to organisational effectiveness, satisfying social needs, and meeting members' ethical and moral needs are crucial. However, excessive integration and obliging strategies help solve strategic problems [1].

Patience, which is among the characteristics expected in managers [28, 29], is defined as a person's tendency to stand calmly in the face of disappointment, distress, or suffering [30]. The concept of patience gives the manager purpose, tolerance,

openness to change, and empathy. It is expected by employees to be more compassionate, open-minded, and willing to manage any situation [29]. Patience has long been recognised as a human strength and a critical component of moral excellence [31]. Its structure saves the individual from negative emotions and increases life satisfaction [32]. The demonstration of true patience depends on both behavioural and emotional components [30]. Patience is positively related to subjective well-being, positive coping, and success [31]. It also includes powerful virtues, such as balance and justice. Patients have less negative affect, lower depression, fewer health problems, and increased life satisfaction [32]. Nurses' patience levels were above the average [33], and it was determined to be a component that affects nurses' resilience in Iran [34].

On the other hand, tranquillity reflects feelings such as comfort, calmness, and serenity, expressed by the characteristics of [35] individuals, such as harmony, balance, comfort, confidence, and inner peace [36]. When there is no threat in daily life, feelings of satisfaction, tranquillity, and well-being emerge, and people generally express their expectations from life in two different ways: tranquillity and happiness [35]. Although studies on patience and tranquillity in the healthcare field are limited, tranquillity and employee performance are positively associated [37]. In this respect, it is thought to be a pioneering study.

Conflicts can frequently emerge due to the complex structure of health services, which are also areas where different disciplines work together. They can happen between health personnel, resulting in medical errors with severe consequences if they are not resolved [38, 39]. Since all conflicts in health institutions will affect cooperation and the delivery of quality health services, managing the conflict with a positive outcome is crucial. Therefore, it is necessary to determine the use of conflict resolution strategies by executive nurses. In addition, nurses work in extraordinary situations such as pandemics. Also, these processes cause nurses to experience depression, stress, and anxiety [40]. These negative emotions can affect the level of patience and peace of mind of nurses. Patience and peace levels of nurse managers will be reflected on the working environment and nurses and will affect the quality of service. The level of patience and peace affected may also influence the choice of conflict resolution strategy. Therefore, this study aims to determine executive nurses' conflict resolution strategies, tranquillity, and patience levels and examine their relationship.

Research Questions.

- (1) Which conflict resolution strategies is the most used by nurse managers in conflict resolution?
- (2) Which levels of tranquillity and patience the nurse managers need?
- (3) Is there a relationship among conflict resolution strategies, tranquillity, and patience levels?

The hypotheses of this study are formulated as follows.

Hypothesis 1. There is a relationship between the patience levels of nurse managers and their conflict resolution styles.

Hypothesis 2. There is a relationship between the serenity levels of nurse managers and their conflict resolution styles.

Hypothesis 3. Patience level and serenity level are related to each other.

2. Methods

2.1. Population and Sample of the Study. This study was conducted as a descriptive cross-sectional study. The study population comprised 60 executive nurses working in the Education and Research Hospital and the State Hospital in a city centre in Karadeniz region. It was aimed to reach all administrative nurses without dealing with the sample determination process. The study was completed with 41 executive nurses who agreed to participate and obtained consent in May 2022. 68% of the research population has been reached.

Inclusion criteria were as follows:

Working as an executive nurse

Volunteering to participate in the study

2.2. Sampling Strategy. The questionnaires were distributed to the executive nurse and collected after they were filled out.

2.3. Data Collection Tools. The data were collected face to face using the Sociodemographic Questionnaire, the Rahim Organizational Conflict Inventory Scale, the Patience Scale, and the Tranquillity Scale.

2.3.1. Sociodemographic Questionnaire. The questionnaire developed by the researcher consists of 11 questions, including age, gender, marital status, educational status, working time in the profession, working time in the current institution, working time as a manager, condition of a conflict with nurses, condition of a conflict with other employees, and state of finding oneself patient and peaceful.

2.3.2. Rahim Organizational Conflict Inventory (ROCI-II). This scale was developed by Rahim in 1983 to identify five different conflict management strategies. It was adapted into Turkish by Gumuseli and Taymaz and consisted of three forms. Form A includes conflict management strategies used by subordinates in conflicts with superiors. Unlike form A, form B holds strategies superiors use in conflicts with subordinates. Form C consists of strategies organisation members use in conflicts with their peers. In this study, form B, also called ROCI II, was used. The scale, which was designed in a 5-point Likert type, consists of 28 items and has options such as always (5), often (4), sometimes (3), rarely (2), and very rarely (1). It reveals individuals' use of five conflict management strategies to what extent. Also, it has the following five subdimensions: integration, compromising, dominating, avoiding, and obliging. Items "1, 5, 12, 22, 23, and 28" are related to the "integration" strategy, items "2, 11, 13, 19, and 24" to "compromising," "8, 9, 18, 21,

and 25" to "dominating," "4, 7, 10, 14, 15, and 20" to "obliging," and items "3, 6, 16, 17, 26, and 27" to the "avoiding" strategy. The score intervals of 4.20–5.00 (always), 3.40–4.19 (often), 2.60–3.39 (sometimes), 1.80–2.59 (rarely), and 1.00–1.79 (very infrequently) are used in grading and interpreting the weighted averages obtained from the scale. A high score from any subdimension indicates that that specific conflict management strategy is used more than others. In contrast, a low score from any subdimension shows that that particular strategy is used less than different strategies [8, 41]. Cronbach's α of the scale subscales was calculated as 0.81 [41]. In this study, Cronbach's α values of the scale were found in the range of 0.66–0.89.

2.3.3. Patience Scale. The Patience Scale was developed by Schnitker, and its validation study in Turkish was conducted by Dogan and Gulmez. There are three subdimensions on the scale, namely, interpersonal patience: 1, 4, 7 (*r*), 9, 11; long-term patience (patience in life hardships) 2, 5, 8; and short-term patience (patience in daily life) 3, 6, 10 (*r*). It was designed in a 5-point Likert type with 11 items and covered the options between "strongly agree" and "strongly disagree." Also, it contains nine positive and two opposing statements. Items 7 and 10 are reverse scored. The highest score on the scale is 55, and the lowest is 11 points. The highest and lowest score ranges that can be obtained from the subdimensions of the scale are interpersonal patience "5–25," long-term patience "3–15," and short-term patience "3–15." A high score obtained from the scale indicates that the patience levels of the individuals are high, whereas a lower score shows a lower level of patience [30, 42]. Cronbach's α of the scale was found to be 0.78 [42]. The Cronbach's α value was found to be 0.68 in the study.

2.3.4. Tranquillity Scale. The Tranquillity Scale developed by Demirci and Eksi is an 8-item one-dimensional scale. Items 5 and 6 are reverse scored. It was designed in a 5-point Likert type, including options such as not at all suitable for me (2), not suitable for me (3), somewhat suitable for me (4), fairly suitable for me (5), and completely suitable for me. The highest score on the scale is 40, and the lowest is 8 points. A high score obtained from the scale indicates that the tranquillity levels of the individuals are high, whereas a lower score shows a lower level of tranquillity. The Cronbach's α internal consistency coefficient of the scale was calculated as 0.78 [35]. Also, its Cronbach's α value was found to be 0.84 in the study.

2.4. Statistical Analysis. For the statistical analysis of the data, the SPSS Statistics 22 software was used. Elements such as percentage, mean, and standard deviation were used to analyse descriptive data. In addition, the Student t-test, Mann-Whitney *U* test, one-way ANOVA, Kruskal-Wallis test, pairwise comparisons, Tukey's HSD post hoc test, and the Pearson correlation analysis were used according to the normal distribution of quantitative data. In the correlation

analysis, 0–0.39 was considered a weak correlation, 0.40–0.69 a moderate correlation, 0.70–0.89 a strong correlation, and 0.90–1.00 a powerful correlation [43]. The level of significance was accepted as $p < 0.05$.

2.5. Ethical Considerations. The study data were collected by obtaining the Ethics Committee’s permission of the university numbered 2022/89 and institutional permissions from the relevant units. Participants agreed to participate voluntarily.

3. Results

37 (90.2%) of the executive nurses participating in the study were women, 38 (92.7%) were married, and their age average was 37.90 ± 7.35 . If we look at their educational status, 27 (65.9%) of them have a bachelor’s degree, 8 (19.5%) have an associate’s degree, 4 (9.8%) are postgraduates, and 2 (4.9%) are high school graduates. Their working hours in the profession are 14.5 ± 7.31 , in the current institution 11.8 ± 7.23 , and as a manager 5.69 ± 5.07 . 21 (51.2%) of the participants stated that they had conflicts with their colleagues, 19 (46.3%) had conflicts with other employees, 38 (92.7%) were patient, and 29 (70.7%) were peaceful. When the reasons stated by those who have conflicts with their colleagues are classified, we develop six themes. The highest cause of conflict is due to working conditions such as lack of personnel and heavy workload, as shown in Figure 1.

When we group the themes as per the literature, 8 (44.4%) of the conflicts are happening due to individual reasons (lack of love and respect, not taking responsibility, lack of empathy, and personal problems), 10 (55.6%) of them due to organisational reasons (working conditions and health policies).

Observations revealed that executive nurses always used the integration strategy, mostly the obliging and compromising strategies and, occasionally, the avoidance and domination strategies. The average score of the Patience Scale is considered moderate with a value of 39.15 ± 6.09 , and its subdimension scores were determined as 9.88 ± 2.42 for short-term patience, 18.02 ± 2.98 for interpersonal patience, and 11.24 ± 2.35 for long-term patience, respectively. Participants’ level of tranquillity is considered moderate, with a score of 3.70 ± 0.70 . In addition, their average scores from the scales are shown in Table 1.

Accordingly, executive nurses’ long-term, short-term, and total patience levels were significantly lower in case of conflict with the nurses ($p = 0.002$, $p = 0.007$, and $p = 0.001$). Their interpersonal patience levels were also substantially lower in case of conflict with other employees ($p = 0.037$). There was no significant difference in the Patience Scale according to gender, marital status, educational status, and being patient and peaceful. No significant difference was found in the Tranquillity Scale by the independent variables. (Table 2).

According to the analysis in Table 3, there was a significant difference in terms of using the strategies of integration and obliging as conflict resolution methods as to

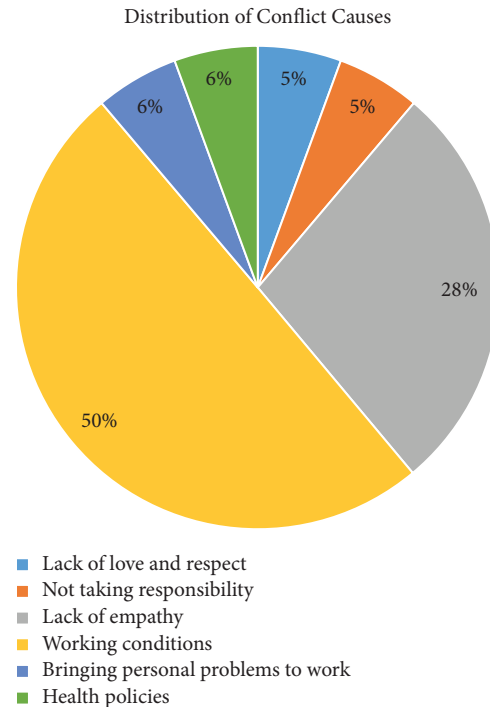


FIGURE 1: Reasons for conflict of executive nurses with colleagues.

TABLE 1: Participants’ Patience Scale, Rahim Organisational Conflict Inventory Scale, and Tranquillity Scale scores.

Scales	n	Minimum	Maximum	χ	Sd.
Patience Scale					
Interpersonal patience	41	11	21	18.02	2.98
Long-term patience	41	5	15	11.24	2.35
Short-term patience	41	4	15	9.88	2.42
Total patience	41	27	47	39.15	6.09
Rahim Organizational Conflict Inventory (ROCI II)					
Integration	41	19	30	4.40	0.52
Compromising	41	8	25	3.61	0.79
Dominating	41	6	25	2.56	0.83
Avoiding	41	6	30	2.93	0.82
Obliging	41	18	30	4.04	0.55
Tranquillity Scale	40	16	40	3.70	0.70

the educational status of the executive nurses ($p = 0.040$, $p = 0.049$). While this difference was observed between postgraduates and high school and undergraduates regarding the integration strategy, it was only seen between postgraduates and undergraduates in the obliging strategy. The table also reveals that postgraduates use the integration and obliging strategies less often. There was no significant difference between conflict resolution strategies by gender, marital status, conflict with nurses and other employees, and state of being patient and peaceful variables. (Table 3).

The correlation analysis revealed that a weak negative correlation was determined between the variable of working time in the institution and both compromising ($r = -0.34$) and obliging ($r = -0.37$). There was a weak negative ($r = -0.37$) correlation between the working time as

TABLE 2: The analysis of the Patience Scale and the Tranquillity Scale with certain variables.

Independent variables	Long-term patience			Short-term patience			Interpersonal patience			Total patience			Tranquillity Scale				
	Mean ± sd	t/F	p	Mean ± sd	t/F	p	Mean rank	U-Z/KWX ²	p	Mean ± sd	t/F	p	Mean ± sd	t/F	p		
Gender																	
Woman	11.24 ± 2.39	t = -0.01		10.11 ± 2.27	t = 1.91		21.70	U = 48.00		39.51 ± 6.05	t = 1.18		3.76 ± 0.66	t = 1.75			
Men	11.25 ± 2.21	p = 0.996		7.75 ± 3.09	p = 0.063		14.50	Z = -1.16	p = 0.274	35.75 ± 6.13	p = 0.245		3.13 ± 0.97	p = 0.088			
Marital status																	
Married	11.16 ± 2.37	t = -0.83		9.79 ± 2.41	t = -0.83		21.21	U = 49.00		39.00 ± 6.22	t = -0.54		3.68 ± 0.73	t = -0.45			
Single	12.33 ± 2.08	p = 0.412		11.00 ± 2.64	p = 0.411		18.33	Z = -0.40	p = 0.723	41.00 ± 4.35	p = 0.590		3.88 ± 0.33	p = 0.655			
Educational status																	
High school	13.50 ± 2.12	F = 1.07		9.00 ± 5.65	F = 0.19		29.00	KWX ² = 1.20		42.00 ± 9.89	F = 0.21		3.69 ± 1.33	F = 0.46			
Associate's degree	10.63 ± 1.50	p = 0.371		10.38 ± 2.61	p = 0.898		20.69	p = 0.752		39.13 ± 4.25	p = 0.889		3.41 ± 0.69	p = 0.712			
Bachelor's degree	11.11 ± 2.63			9.81 ± 2.54			20.17			38.78 ± 6.81			3.75 ± 0.71				
Postgraduates	12.25 ± 0.95			9.75 ± 2.50			23.25			40.25 ± 2.87			3.81 ± 0.60				
Condition of a conflict with nurses																	
Yes	10.19 ± 2.18	t = -3.27		8.90 ± 2.54	t = -2.86		18.05	U = 148.00		36.29 ± 5.65	t = -3.48		3.58 ± 0.72	t = -1.13			
No	12.35 ± 2.03	p = 0.002		10.90 ± 1.83	p = 0.007		24.10	Z = -1.64	p = 0.101	42.15 ± 5.08	p = 0.001		3.83 ± 0.68	p = 0.266			
Condition of a conflict with other employees																	
Yes	11.21 ± 1.98	t = -0.08		9.37 ± 2.52	t = -1.26		16.87	U = 130.50		37.89 ± 5.02	t = -1.23		3.51 ± 0.69	t = -1.65			
No	11.27 ± 2.67	p = 0.934		10.32 ± 2.29	p = 0.214		24.57	Z = -2.08	p = 0.037	40.23 ± 6.81	p = 0.226		3.87 ± 0.68	p = 0.106			
Are you patient																	
Yes	11.18 ± 2.35	t = -0.57		9.95 ± 2.49	t = 0.64		21.03	U = 56.00		39.16 ± 6.32	t = 0.04		3.70 ± 0.72	t = 0.18			
No	12.00 ± 2.64	p = 0.570		9.00 ± 1.00	p = 0.521		20.67	Z = -0.05	p = 0.981	39.00 ± 1.00	p = 0.966		3.63 ± 0.66	p = 0.857			
Are you peaceful																	
Yes	11.48 ± 2.21	t = 1.01		10.24 ± 2.48	t = 1.51		23.26	U = 108.50		40.03 ± 6.13	t = 1.47		3.75 ± 0.72	t = 0.66			
No	10.67 ± 2.67	p = 0.318		9.00 ± 2.08	p = 0.137		15.54	Z = -1.90	p = 0.060	37.00 ± 5.64	p = 0.149		3.58 ± 0.68	p = 0.513			

sd: standard deviation, KW: Kruskal-Wallis, U: Mann-Whitney U.

TABLE 3: The analysis of conflict resolution strategies with certain variables.

Independent variables	Compromising			Dominating			Integration			Avoiding			Obliging		
	Mean \pm sd	<i>t/F</i> <i>p</i>		Mean \pm sd	<i>t/F</i> <i>p</i>		Mean rank	U-Z/KWX ² <i>p</i>	Mean \pm sd	<i>t/F</i> <i>p</i>		Mean \pm sd	<i>t/F</i> <i>p</i>		
Gender															
Woman	3.64 \pm 0.81	<i>t</i> = 0.69		2.53 \pm 0.86	<i>t</i> = -0.72		21.41	<i>U</i> = 59.00 <i>Z</i> = -0.666 <i>p</i> = 0.505	2.95 \pm 0.86	<i>t</i> = 0.55		4.05 \pm 0.56	<i>t</i> = 0.55	<i>t</i> = 0.15	
Men	3.35 \pm 0.72	<i>p</i> = 0.490		2.85 \pm 0.44	<i>p</i> = 0.472		17.25		2.71 \pm 0.44	<i>p</i> = 0.584		4.00 \pm 0.53	<i>p</i> = 0.584	<i>p</i> = 0.879	
Marital status															
Married	3.62 \pm 0.77	<i>t</i> = 0.03		2.55 \pm 0.85	<i>t</i> = -0.22		21.11	<i>U</i> = 53.00 <i>Z</i> = -0.202 <i>p</i> = 0.840	2.93 \pm 0.81	<i>t</i> = -0.03		4.04 \pm 0.55	<i>t</i> = -0.03	<i>t</i> = 0.13	
Single	3.60 \pm 1.25	<i>p</i> = 0.974		2.67 \pm 0.70	<i>p</i> = 0.823		19.67		2.94 \pm 1.18	<i>p</i> = 0.970		4.00 \pm 0.60	<i>p</i> = 0.970	<i>p</i> = 0.896	
Educational status															
High school	3.60 \pm 1.13	<i>F</i> = 1.21		1.90 \pm 0.42	<i>F</i> = 0.45		28.25	KWX ² = 8.297 <i>p</i> = 0.040	3.00 \pm 0.24	<i>F</i> = 0.32		3.83 \pm 0.71	<i>F</i> = 0.32	<i>F</i> = 2.87	
Associate's degree	3.53 \pm 0.46	<i>p</i> = 0.318		2.53 \pm 0.64	<i>p</i> = 0.719		17.19		2.79 \pm 0.81	<i>p</i> = 0.811		4.00 \pm 0.49	<i>p</i> = 0.811	<i>p</i> = 0.049	
Bachelor's degree	3.74 \pm 0.85			2.61 \pm 0.93			23.63		3.01 \pm 0.88			4.17 \pm 0.53			
Postgraduates	2.95 \pm 0.62			2.65 \pm 0.59			7.25		2.63 \pm 0.84			3.38 \pm 0.37			
Condition of a conflict with nurses															
Yes	3.56 \pm 0.67	<i>t</i> = -0.43		2.69 \pm 0.83	<i>t</i> = 0.98		19.05	<i>U</i> = 169.0 <i>Z</i> = -1.081 <i>p</i> = 0.280	3.02 \pm 0.66	<i>t</i> = 0.76		3.99 \pm 0.53	<i>t</i> = 0.76	<i>t</i> = -0.57	
No	3.67 \pm 0.92	<i>p</i> = 0.669		2.43 \pm 0.83	<i>p</i> = 0.332		23.05		2.82 \pm 0.97	<i>p</i> = 0.448		4.09 \pm 0.58	<i>p</i> = 0.448	<i>p</i> = 0.570	
Condition of a conflict with other employees															
Yes	3.49 \pm 0.71	<i>t</i> = -0.89		2.57 \pm 0.82	<i>t</i> = 0.05		19.50	<i>U</i> = 180.5 <i>Z</i> = -0.753 <i>p</i> = 0.451	2.92 \pm 0.81	<i>t</i> = -0.04		3.97 \pm 0.54	<i>t</i> = -0.04	<i>t</i> = -0.71	
No	3.72 \pm 0.86	<i>p</i> = 0.376		2.55 \pm 0.86	<i>p</i> = 0.958		22.30		2.93 \pm 0.86	<i>p</i> = 0.967		4.10 \pm 0.56	<i>p</i> = 0.967	<i>p</i> = 0.477	
Are you patient															
Yes	3.66 \pm 0.79	<i>t</i> = 1.25		2.50 \pm 0.83	<i>t</i> = -1.71		21.74	<i>U</i> = 29.00 <i>Z</i> = -1.417 <i>p</i> = 0.156	2.95 \pm 0.85	<i>t</i> = 0.56		4.06 \pm 0.09	<i>t</i> = 0.56	<i>t</i> = 0.85	
No	3.07 \pm 0.61	<i>p</i> = 0.219		3.33 \pm 0.11	<i>p</i> = 0.095		11.67		2.67 \pm 0.50	<i>p</i> = 0.578		3.78 \pm 0.43	<i>p</i> = 0.578	<i>p</i> = 0.398	
Are you peaceful															
Yes	3.63 \pm 0.88	<i>t</i> = 0.16		2.63 \pm 0.87	<i>t</i> = 0.79		22.16	<i>U</i> = 140.5 <i>Z</i> = -0.971 <i>p</i> = 0.332	2.95 \pm 0.88	<i>t</i> = 0.32		4.10 \pm 0.61	<i>t</i> = 0.32	<i>t</i> = 1.138	
No	3.58 \pm 0.58	<i>p</i> = 0.873		2.40 \pm 0.74	<i>p</i> = 0.433		18.21		2.86 \pm 0.71	<i>p</i> = 0.748		3.89 \pm 0.34	<i>p</i> = 0.748	<i>p</i> = 0.262	

sd: standard deviation, KW: Kruskal-Wallis, U: Mann-Whitney U.

a manager variable and the obliging strategy. A weak positive ($r=0.35$) correlation was determined between short-term patience and the level of tranquillity.

Then again, a moderate positive correlation was found between the strategies of integration and compromising ($r=0.66$), a strong correlation with obliging ($r=0.77$), and a weak positive correlation with the level of tranquillity ($r=0.31$). The correlation analysis is shown in Table 4.

4. Discussion

This study, which investigated the strategies of nurses working in managerial positions in two different hospitals in conflict management and their levels of patience and tranquillity, revealed that 51.2% of the participants had conflict with their colleagues and 46.3% with other employees. In similar studies, 61.4% of the nurses in charge of the service stated that they had conflicts with the other nurses [11], and conflict was experienced by all critical care nurses, with 42.5% of the studied nurses having had moderate conflict [44]. This can be explained by the fact that different professional members work together in the health sector, working conditions are complex, and the workload is high. As per the study, the participants mostly used the "integration" strategy in conflict management, the second most "obliging," and the least "dominating." Similar to this study, in other relevant studies, it was stated that the strategies of integration and compromising [11, 12, 25, 45–48] were used the most, and the domination [12, 25] strategy was used the least. In addition, some studies indicate the least used strategy was avoidance [11, 45, 46]. The fact that the nursing students mainly used the compromising strategy and least the domination strategy shows similarity with our results [26]. According to the literature, strategic solutions can be solved by integrating and obliging [1]. Consistent with this information, executive nurses use the strategies desired in conflict resolution more. Although administrative nurses and nursing students use the compromising strategy more often in conflict resolution, the data show that conflict continues at high rates in hospitals. Therefore, it is crucial to attempt to solve the individual and organisational factors that are considered to be the cause of this situation. In a study, it was shown that by using tele-nursing application, it can improve the delivery of health services by increasing access to specialised services where mutual communication and interaction are well established [49]. Similarly, tele-nursing application can be tried in conflict resolution.

According to our study, postgraduate executive nurses used "integration" and "obliging" strategies less than high school and undergraduate nurses. While it was similar in one study that undergraduates used the compromising strategy less than other strategies [46], the educational status variable did not make a significant difference in conflict resolution strategies in other studies [11, 45, 47]. This difference may be due to the different grouping of the educational status variable. The fact that postgraduates are positioned in senior management is not unexpected. On the other hand, executives are more likely to resolve strategic

conflicts involving differences in planning and objectives, and the literature suggests using the strategies of integration and obliging in strategic conflict resolution. Integration and compromise styles allow all employees to adopt the organisation's goals and objectives. So, the reason for the decrease in integration and generous strategies, which were widely used by students and postgraduates, should be investigated in other studies.

As the duration of work in the profession and the hospital increases, the usage of the strategies of compromising and obliging decreases. Similarly, one study found that the compromising strategy decreased as the experience and seniority increased, which supports our study results [46]. This study has also revealed that the compromising strategy decreased as the working time as a manager increased. According to another study, while the generous strategy was used more in those who worked as a manager for 20 years or more, avoidance was used more in those who worked for 6–10 years [45]. Working as a long-term manager can increase organisational commitment and the use of a compromising strategy. The difference in this study may be that nurses have less managerial experience. Besides, there are studies in which these variables do not make a difference [47].

In this study, the age average was 37, and no significant relationship was found between age and conflict resolution strategies. There are other supporting studies with the same results [47]. However, as a result of this study, the compromising strategy was used significantly more by employees over 45 [45]. The majority of the young population in this study, which showed a positive correlation between age and experience, may explain the difference from the other research.

In the study, similar to the literature, the gender [27] and marital status [45] variables did not make a significant difference in conflict management strategies. Unlike this study, there are studies where males prefer to use the generous [46] or avoidance [47] strategies more, while females prefer to use the integration strategy more [47].

92.7% of the participants think that they are patient. When we look at the scale scores, their patience levels are above average in total and subdimensions, similar to a study [33]. Also, it was observed that although executive nurses' long-term, short-term, and total patience levels decreased during a conflict with the nurses, their interpersonal patience levels did not change. These results suggest that executive nurses maintain communication with nurses by looking at events situationally to ensure the continuity of their work. Their interpersonal patience levels decrease during a conflict with other employees. This may suggest that they individualise the events more. The literature shows a positive relationship between patience and decision-making skills [50]. Therefore, the decrease in the interpersonal patience levels of executive nurses may affect their problem-solving skills and create new clash environments. In this case, it may lead to communication loss with other employees. The study found no relationship between patience level and conflict resolution. In this case, hypothesis 1 is rejected.

TABLE 4: The correlation between independent variables, the Patience Scale, the Tranquillity Scale, and the Rahim Organisational Conflict Inventory Scale.

Variables	Working time in the profession	Working time in the current institution	Active time as a manager	Interpersonal patience	Long-term patience	Short-term patience	Total patience	Integration	Compromising	Dominating	Avoiding	Obliging	Tranquillity level
Age	<i>r</i> 0.77***	0.69***	0.49**	0.01	-0.04	-0.12	-0.06	-0.21	-0.23	-0.05	-0.08	-0.24	-0.03
Working time in the profession	<i>r</i> 1.00	0.88***	0.67***	0.01	-0.02	-0.09	-0.04	-0.23	-0.34*	-0.17	-0.17	-0.37*	0.04
Working time in the current institution	<i>r</i> 1.00	1.00	0.73***	0.1	0.05	-0.06	0.06	-0.22	-0.34*	-0.13	-0.20	-0.37*	0.02
Working time as a manager	<i>r</i> 1.00	1.00	1.00	0.07	0.14	0.05	0.11	-0.24	-0.26	-0.16	-0.17	-0.34*	0.08
Interpersonal patience	<i>r</i> 1.00	1.00	1.00	1.00	0.52***	0.47**	0.88***	0.13	0.07	0.15	0.17	0.22	-0.07
Long-term patience	<i>r</i> 1.00	1.00	1.00	1.00	1.00	0.22	0.73***	-0.01	-0.06	0.16	0.02	0.09	0.11
Short-term patience	<i>r</i> 1.00	1.00	1.00	1.00	1.00	1.00	0.71***	0.02	0.08	0.12	0.08	0.06	0.35*
Total patience	<i>r</i> 1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.07	0.04	0.19	0.12	0.17	0.14
Integration	<i>r</i> 1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.66***	0.10	0.27	0.77***	0.31*
Compromising	<i>r</i> 1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.26	0.65***	0.70***	0.16
Dominating	<i>r</i> 1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.54***	0.40**	0.11
Avoiding	<i>r</i> 1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.50**	-0.09
Obliging	<i>r</i> 1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.11

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

70.7% of the participants in the study stated that they were peaceful, and their tranquillity levels were found to be moderate according to the scale. Also, there was a positive correlation between their tranquillity and short-term patience levels. This finding supports hypothesis 3. During a conflict with nurses whose short-term patience levels are low, there is expected to be a decrease in the tranquillity levels of executive nurses. The fact that their tranquillity level could have been higher in this study may be the fact that they always use the integration strategy. Considering this study, a positive correlation was found between the integration strategy and the level of tranquillity. This relationship supports hypothesis 2.

4.1. Limitations and Strengths. Including only public institutions in the study and the small number of managers may be a limitation. However, it is a strength that the issues of patience and peace of mind are addressed together. What makes this work powerful is that no studies have been found in the healthcare field in which conflict management strategies are being studied together with tranquillity and patience. In addition, the fact that studies on patience and tranquillity in nurses are limited in general makes this study vital.

5. Conclusion and Recommendations

Accordingly, the participants used all conflict management strategies, mostly “integration” and frequently “obliging” and “compromising.” Also, their educational status was influential in their conflict management strategy preferences. In addition, the patience and tranquillity levels of the participants were moderate. While their long- and short-term patience levels decrease in case of a conflict with nurses, their interpersonal patience levels decrease in a conflict with other employees in the hospital. This study has also revealed that the level of tranquillity increases as the integration strategy is used in conflict resolution. On the other hand, no relationship was found between patience and conflict management strategies. This finding indicates that executive nurses maintain professionalism and exhibit the same attitude in the face of events.

Due to its nature, health services have a complex structure, and it is an area where different disciplines work together, so conflicts are inevitable. They need to be managed in a way that will result in a positive outcome as it will affect cooperation and quality of health service delivery. For tranquillity, activities such as in-service training are recommended to increase the use of “integration” by all managers. It is crucial to draw attention to this issue, especially in the postgraduate education process. A unit can be established within the organisation for staff only, where nurses can receive support when they feel that their level of patience and peace of mind has decreased. It is recommended that similar issues be studied with nurses and other health professionals in future studies. In addition, qualitative research methods can be used to examine the issues in depth.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure

This research was presented at the 6th International Congress on Nursing and Innovation 2022

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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Research Article

Examining the Relationship between Workplace Fun and Innovative Behavior among Nurses: The Mediating Effect of Innovation Support and Affective Commitment

Maryam Hashemian ¹, Azam Hashemian Moghadam ², Mirtohid Hosseini ³,
Islam Azizpour ¹ and Alireza Mirzaei ⁴

¹Students Research Committee, School of Nursing and Midwifery, Ardabil University of Medical Sciences, Ardabil, Iran

²Department of Psychology, Faculty of Education and Psychology, Ferdowsi University of Mashhad, Mashhad, Iran

³Department of Critical Care Nursing, School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran

⁴Department of Emergency Nursing, School of Nursing and Midwifery, Ardabil University of Medical Sciences, Ardabil, Iran

Correspondence should be addressed to Alireza Mirzaei; alirezamirzaei9015@gmail.com

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Aim. This study investigated the role of cultural, organizational, and managerial support, workplace fun, affective commitment, innovative behavior with innovative output, and also the mediating role of innovative behavior in the framework of a causal model. **Background.** Innovation is the driving force of development in hospitals, and the quality of healthcare is closely related to hospital innovation. Today, nurses with innovative behaviors are the biggest asset of any hospital because they are involved in any improvement and progress. **Methods.** This descriptive cross-sectional correlational study was conducted using causal modeling methods, including path analysis and structural equation modeling. Using the proportional stratified sampling method, 321 nurses from Ardabil teaching hospitals were included in the study. Data were collected by standard demographic characteristics, innovative behaviors, innovative support, workplace fun, and affective commitment questionnaires. Partial least square structural equation modeling (PLS-SEM) was used to test the conceptual model using PLS-SMART 2 software. **Results.** Cultural support had a positive and significant effect on innovative behavior by affecting organizational support and then managerial support. In addition, workplace fun had a positive and significant effect on innovative behavior directly and indirectly through the mediating role of affective commitment. Finally, innovative behavior also had a positive and significant effect on nurses' innovative output. **Conclusion.** Supervisors and managers can adopt the organizational and managerial support approach to improve the nurses' innovative behaviors. Workplace fun will also improve nurses' innovative behaviors and affective commitment, thereby increasing their innovative output. **Implications for Nursing Management.** By adopting organizational and managerial support for nurses' innovative behaviors, managers should take measures that promote workplace fun and affective commitment to improve nurses' innovative output by encouraging innovative behaviors.

1. Introduction

To provide quality healthcare, hospitals must adopt innovative practices [1]. With the constantly evolving health technology and increasing demand for healthcare services, hospitals need to improve their efficiency, creative thinking,

and value [2]. Innovative behavior involves generating, cultivating, and implementing new ideas within an organization or workgroup [3]. Implementing innovative nursing practices in hospitals directly influences their performance [1, 4]. The particular area where a hospital implements innovative nursing practices has a significant

impact on its overall performance [1, 4]. Continuous innovation of nurses not only fulfills their developmental needs but helps managers improve their work performance [1]. One strategy that managers can employ to encourage innovation is to create a fun work environment [4].

Workplace fun includes socializing with colleagues, celebrating at work, personal freedoms, participating in challenges, performance-based competitions, and generally fun activities at work [5]. Workplace fun affects the attitudes and working behaviors of employees and strengthens their creativity of employees. The effects of workplace fun on innovation have been mentioned in studies [1]. Tews et al. reported that a fun work environment is more attractive to employees than their salary and promotion [6].

Employees usually pursue their affective needs after meeting material needs [7]. Affective commitment describes the employee's emotional dependence on identification and participation in the organization and the individual's emotional orientation towards the organization. Affective commitment is revealed when employees accept that initiative is necessary to maintain the image and reputation of the organization, promote the organization, work hard for the development of the organization, and have high trust and loyalty to the organization [1]. In addition, the role of organizational commitment in the emergence of innovative behaviors has also been seen [8]. For people's innovative behaviors to be transformed into new and effective products and methods, more efforts of employees are needed, and the support of managers and some influential organizational variables are also required [3]. Different leadership styles affect organizational innovation [7].

The more supportive the leadership style, such as transformational leadership, the more innovative behaviors will be in that organization. In the studies conducted on nurses, the cultural climate supporting innovation in the organization and managerial support for innovation has had a positive relationship with the innovative behaviors of nurses [9]. Despite the abovementioned cases, employees have often shown that their managers still deny them from having a fun workplace [10].

The effect of a supportive work environment on employee innovation is significant, but it is often neglected in Iranian hospitals. Despite the importance of recreational activities in promoting innovative behaviors, more research needs to be done in this field, especially among nurses in Iran. To fill this gap, a pioneering study was conducted in Ardabil City, which examined the relationship between innovative behavior, workplace fun, support for innovation, and affective commitment among nurses. These findings illuminate the benefits of a positive work culture and inform future efforts to foster innovation in healthcare settings.

2. Literature Review

Numerous factors can affect innovation, including individual and contextual factors. Three factors that influence employees' innovation are cultural, managerial, and organizational support [3, 11]. Among these factors, some, such as the direct manager's influence, support, and leadership

style, can have more significant effects than cultural factors. Innovation is a managerial process that requires approval from the organization and its managers [12]. However, the national culture governing the society can affect the leadership style of managers and the organizational support provided [3]. According to Sönmez et al.'s study [4], leadership support has a positive impact on increasing innovative behaviors and ultimately leads to an increase in the innovative output of employees. In Yang et al.'s study [13], it was found that humble leadership fostered innovative behaviors in nurses. Based on these findings, we hypothesized that innovative support positively correlates with innovative behaviors.

Over the past few years, the importance of having a fun work environment and its impact on employee behavior and performance has been recognized [14]. Creating a pleasant and humorous atmosphere in the workplace encourages positive behavior among employees [15]. A fun-filled workplace can lead to a reduction in stress levels and increase enjoyment, resulting in better engagement with the team, colleagues, and the organization as a whole. In addition, having fun at work has a positive effect on creativity, work performance, and the affective commitment of employees [16]. By incorporating fun activities into the work environment, employees can show more innovative behaviors and improve the overall work environment [1]. Managers offer their care and support for employees by creating exciting conditions in the work environment, and employees show more organizational behaviors, such as innovation, to return it to managers [17]. The results of Jing et al.'s study [1] showed that nurses who had fun in the work environment showed more innovative behaviors, and this mechanism could be due to the effects of affective commitment created in employees seeking fun in their work environment. When the organization creates a calm environment through entertainment for nurses, they will be more active and creative in terms of thinking [1]. Therefore, the following hypothesis was developed: workplace fun positively correlates with innovative behaviors.

Affective commitment is the psychological identification of employees with the goals and values of the organization and the level of belief and support for it [18]. Affective commitment is revealed when employees take the initiative to maintain the image and reputation of the organization, inform the public about the organization, strive for the development of the organization, and have high trust and loyalty to the organization [1, 15]. Such people show more ability to participate in the activities of an organization. They are always ready to try beyond their duty to achieve the organization's goals [12, 18]. Affective commitment can predict employees' feelings, such as trust and stress, or organizational behaviors, such as absenteeism from the workplace or organizational innovation [19]. It has been observed that employees with a higher level of commitment to their organization continually develop creative solutions to work-based problems and, thus, show a greater tendency to engage in innovative behaviors [20]. Therefore, we hypothesized that affective commitment positively correlates with employees' innovative behaviors.

One of the most critical issues that define a person's behavior in an organization is affective commitment. Affective commitment shows the individual's identity and participation and enjoyment in the organization. People who have an affective commitment to the organization go beyond simply staying in the organization. One of the factors that can create affective commitment in a person is fun at work. Putri et al.'s study [19] showed that fun at work through employees' work participation can lead to affective commitment in employees. Also, Al Bazzal's study [21] also showed that fun in the work environment directly leads to affective commitment in people. Other studies show that having fun at the workplace by creating a happy atmosphere for employees leads to the creation of teamwork spirit and thus leads to an increase in affective commitment in the individual [22]. The existence of such arguments led us to create the following hypothesis: workplace fun has a positive relationship with affective commitment.

There have been few studies conducted to examine the relationship between innovative behavior and workplace fun, affective commitment, and support for innovation. To fill this gap in research, it is important to study all the influential variables proposed in the structural model of innovation in the hospital and the treatment environment. This includes examining the importance of these variables and refining the relationships between them through the inclusion of other structures such as workplace recreation and affective commitment. By doing so, we can gain a more accurate theoretical explanation of the behavior and ultimately the innovative output of nurses in the workplace.

Therefore, the purpose of this study is to examine the indirect role of the hierarchies of cultural, organizational, and managerial support, as well as the direct and indirect effects of workplace entertainment, through the mediation of affective commitment. This study aims to examine the relationship between innovative behavior and the output variable, while also exploring the potential mediating role of affective commitment and managerial and organizational support on innovative behavior. The study will focus on nurses and test a conceptual model using the structural equation modeling method. The model was developed based on existing theoretical and research background. The study hypotheses are displayed in Figure 1.

3. Methods

3.1. Aims. Although there are studies related to the issues raised above, the effect of workplace fun on the innovative behavior of nurses in the working environment of Iranian hospitals is a topic that has not been sufficiently researched and its mechanisms have not been revealed well. Therefore, this study is the first to investigate the relationship between innovative behavior and workplace fun, innovation support, and affective commitment among nurses in Ardabil City, Iran.

3.2. Design. This descriptive cross-sectional research was conducted using causal modeling methods, including path analysis and structural equation modeling.

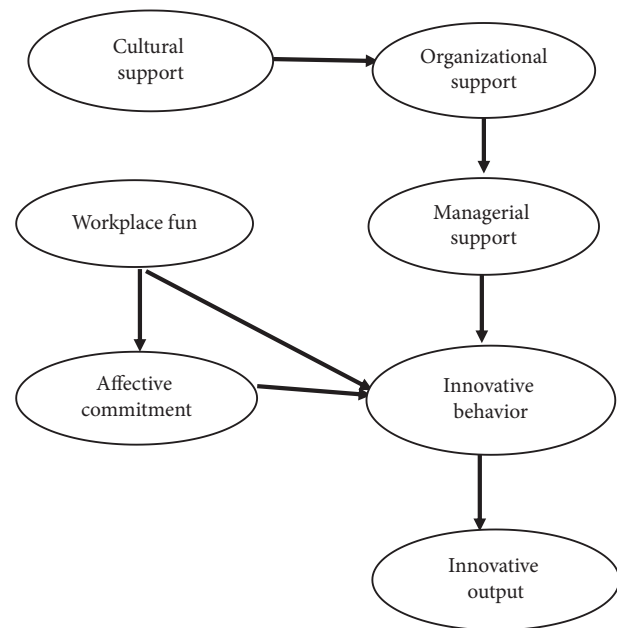


FIGURE 1: A graphical model highlighting the hypothesized relationships.

3.3. Participants. The statistical population included all nurses ($n = 1284$) of five teaching hospitals in Ardabil, a city located in the northwest of Iran. The inclusion criteria were nurses who worked in clinical settings and had at least 6 months of nursing experience. They also reported that they had no history of physical or mental illnesses. Nurses who had continuous leave of absence for more than three months and nursing supervisors and managers were excluded from the study.

3.4. Data Collection. A study was conducted on 291 nurses to determine an appropriate sample size using Krejcie and Morgan's [23] table. This method is used when the entire study population is known. For studies using the structural equation method, the minimum sample size should be 20 times higher than the number of subscales. There were 16 subscales in this case, so the minimum sample size required was 320. Assuming a 10% attrition rate, the final sample size estimated was 321 participants.

The Vice Chancellor of Nursing at the University of Medical Sciences was contacted to determine the appropriate number of healthcare professionals required in Ardabil City based on the population. The study included 140 nurses from Imam Khomeini Hospital (out of 560 individuals), 65 from Fatemi Hospital (out of 260 individuals), 40 from Alavi Hospital (out of 160 individuals), 35 from Imam Reza Hospital (out of 140 individuals), and 41 from Bu Ali Hospital (out of 164 individuals) using proportionate stratified sampling. Simple random sampling was used within each stratum. After obtaining the code of ethics, the researchers introduced themselves to the nursing offices of the teaching hospitals. Then, before sampling, they referred to different departments, introduced themselves to the nurses, and provided

explanations about the research design and objectives and completing the questionnaires. Data were collected from January to March 2023.

3.5. Measures

3.5.1. Social Demographics, Workplace Fun, Affective Commitment, Innovative Behavior and Innovation Support Questionnaire. The sociodemographic questionnaire included age, gender, marital status, education, work sector, experience, professional level, monthly income, shift type, and overtime.

3.5.2. Workplace Fun. Workplace fun was measured using fourteen items adopted from Tews et al. [6]. This questionnaire has 14 items and three subgroups of socializing with colleagues, manager's support for fun, and attachment. Each item is rated on a five-point Likert scale, including completely disagree = 1, disagree = 2, neutral = 3, agree = 4, and completely agree = 5(6). The overall Cronbach's alpha coefficient of this questionnaire was reported to be 0.90 in the study of Tews et al. [6] and 0.86 in this study.

3.5.3. Affective Commitment. The organizational commitment questionnaire was developed by Allen and Meyer [24]. It has three affective [1–8], continuous [9–16], and normative [17–24] dimensions. In this study, only the affective dimension of this questionnaire was used. Responses are scored on a five-point Likert scale, from completely disagree = 1, disagree to completely agree = 5; the lowest score is 8 and the highest score is 40. A higher score indicates more affective commitment. The Cronbach's alpha of the affective dimension was computed to be 0.85 in Allen and Mayer's study [24] and 0.73 in this study.

3.5.4. Innovative Behavior Scale. This scale was prepared by Lukes and Stephan [3] by examining other innovative behavior scales. While reviewing the other scales, they deleted or modified some of the items in those scales. Innovative behavior scales include 23 questions and six dimensions. The six dimensions of innovative behavior include idea generation (3 items), idea search (3 items), idea communication (4 items), application (3 items), involving others (3 items), and overcoming obstacles (4 items). The overall mean score of the six subscales constitutes the overall score of the innovative behavior scale. The innovation output dimension consisting of three items is evaluated separately. Participants respond to questions on a five-point Likert scale, from strongly disagree = 1 to strongly agree = 5. An increase in the overall score of the innovative behavior scale and the subscale score of innovation output indicates an increase in innovative behavior and innovation output. The Cronbach's alpha values in the subscales of innovative behavior ranged from 0.60 to 0.88 in Lukes and Stephan's study [3] and from 0.79 to 0.96 in this study.

3.5.5. Innovation Support Inventory. This scale was also developed by the same authors [3]. It includes 12 items and three dimensions, including managerial support,

organizational support, and cultural support. The items are rated on a 5-point Likert scale, and increased scores of subscales indicate increased innovation support. Cronbach's alpha values of innovation support subscales varied from 0.77 to 0.82 in Lukes and Stephan's study [3] and from 0.91 to 0.93 in this study.

To use the workplace fun, innovative behavior, and innovation support questionnaires, after obtaining permission from the original designers, these instruments were subjected to forward-backward translation. First, they were translated into Persian by two expert translators who were blinded to each other. Then, both translations were merged into one by choosing the best words from each. Next, this selected Persian text was again translated into English by two translators who were fluent in English and did not know each other and the original text of the questionnaire. It was also ensured that the translated text matched the original text of the questionnaire. Then, before collecting the data, the content validity and face validity of the questionnaire were evaluated. For this purpose, the desired tool along with a list was provided to 14 nursing education experts and professors at Ardabil University of Medical Sciences, and they were asked to rate the items as necessary, useful but unnecessary, and unnecessary. Finally, the content validity indices of the workplace fun, innovative behavior, and innovation support questionnaires were calculated to be 0.89, 0.92, and 0.88, respectively. Then, to measure the reliability of the questionnaires, Cronbach's alpha coefficients were calculated for the questionnaires and their dimensions, whose values were above 0.79. These results showed that the questionnaires and their subscales had an acceptable level of reliability.

4. Data Analysis

This research implements variance-oriented partial least squares (PLSs) to conduct structural equation modeling. PLS is preferred due to its flexibility and reliability in handling complex models with smaller sample sizes. Two software, SmartPLS, and LISREL, adopt different approaches to evaluate the model fit. SmartPLS focuses on indicators related to the adequacy of the model in predicting dependent variables. Internal consistency, convergent validity, and predictive power are crucial indicators utilized to determine the model's goodness of fit.

The current research is of the type of structural equations in which the partial least squares method of the variance axis type is used. The difference between the variance-based method (partial least squares such as SmartPLS) and the covariance-based method (such as LISREL) is that this method does not require special distributional assumptions and is compatible with any number of samples, especially in more complex models with the number of variables is greater, even with a lower sample number, the results are still reliable. Also, this method has fewer limitations and is especially suitable in cases where predictive properties between variables are needed. In general, the power of this method is much higher than covariance-based modeling. This method has many validity indices that are used for

composite structures. Also, at the alpha level of 0.01 and below, the statistical t-values higher than 1.96 are also considered significant.

In this research, the model of the relationships of workplace fun variables, affective commitment to innovation support, and innovative behavior as second-order and hierarchical constructs was tested in the form of a conceptual model through structural equation modeling, and the partial least squares method was used to test the measurement model. In testing the measurement model, convergent validity and average variance extracted (AVE) indices were used to assess validity [25]. To evaluate reliability, Cronbach's alpha (α) and composite reliability [26] were used. In the structural model section, the R^2 and Q^2 indices were used, the coefficient of determination or R^2 for dependent variables shows the amount of explanation of the variable by the developed model [27, 28]. The Q^2 index or Stone Geissler coefficient ($(sse/sso)-1$), which is the quality index of the structural model, examines the predictive power of the structural model [28, 29]. The f^2 index also shows the effect size of the independent variables. SPSS (version 14) and SmartPLS (2nd version) were used for data analysis.

5. Ethical Considerations

This study was approved with the ethical code IR.AR-UMS.REC.1401.153 by the Research Ethics Committee of Ardabil University of Medical Sciences. After obtaining the necessary permits, data collection was carried out from January to March 2023. Written informed consent was obtained from all participants. It was explained to the participants that the data would be kept anonymous and confidential. This survey was conducted on healthcare professionals who voluntarily agreed to participate in the study.

6. Results

6.1. Descriptive Statistics. In this research, 321 nurses in five hospitals in Ardabil received the set of questionnaires. All questionnaires were fully answered and analyzed. Table 1 presents the descriptive indices, including mean, standard deviation, median, mode, skewness, and kurtosis related to each of the research variables.

6.2. Correlation Matrix. The correlation matrix, the relationship between constructs, and their significance are reported in Table 2(a-c).

The study focuses on the measurement model's reliability and validity using convergent validity and AVE. Convergent validity measures how well a hidden variable is understood by its items. Fornell and Larcker [25] established a criterion for the variance of this validity, where a value above 0.5 is deemed acceptable. For convergent validity, AVE values should be at least 0.5, and CR values should be at least 0.7. According to SmartPLS, all constructs in this study had a CR higher than 0.7, indicating convergent validity.

Divergent validity is checked by using a construct's square root (e), which should be higher than the correlation of that construct with other constructs [28]. This indicates

that the correlation of that construct with its indicators is higher than its correlation with different constructs. Tables 2(a-c) presents the validity check results on the correlation matrix's diameter, showing the appropriate validity of the constructs.

6.3. Research Model Indicators. The study also evaluated the measurement model's reliability using Cronbach's alpha value of at least 0.7, which was considered acceptable. Another criterion called composite reliability was introduced by Werts et al. and is also used in the partial least square method. The values in Table 3(a-c) are more significant than 0.7, indicating that the measurement models possess good internal consistency. In addition, Section 6.3 [26] specifies the research model indicators. The reliability of the innovative behavior structure was 0.946 (Cronbach's alpha), and the convergent validity (AVE) and discriminant validity (AVE) were 0.495. The reliability of emotional commitment was 0.755, and the convergent and discriminant validity was 0.464. Lastly, the reliability for workplace fun was 0.982, and the convergent and discriminant validity was 0.451.

After verifying the validity of the constructs, it was found that the AVE index in three constructs, namely, innovative behavior (AVE = 0.495), affective commitment (AVE = 0.464), and workplace fun (AVE = 0.451), was below the recommended acceptable range suggested by Fornell and Larcker. Specific questions with a lower factor load in each structure were removed from each scale to address this issue. Specifically, questions 1, 4, 13, and 14 were removed from the Workplace Fun scale, question 17 was removed from the Innovative Behavior scale, and question 8 was removed from the Affective Commitment scale. Following this, the AVE index was re-examined, and it was found to be 0.506, 0.543, and 0.503 for Innovative Behavior, Affective Commitment, and Workplace Fun, respectively. All three values were above 0.5 and considered acceptable. The model was then rerun, and the values of the indices, relationships between variables, and factor loadings were updated in Figure 2.

In addition, as per the referee's request, the hidden variables of the second order, i.e., workplace fun and innovative behavior, were run in separate models (Figures 3 and 4). The indices of convergent validity, divergent validity, and reliability of the subscales in these two models are presented and reported in Tables 2(b-c) and 3(b-c). All the reliability and validity indices for these two hidden variable subscales were within the acceptable range.

6.4. Factor Load Coefficients Significance of Each Model Paths. In examining the structural model, the coefficient of determination or R^2 for dependent variables showed the degree of explanation of the variable by the developed model [27]. As shown in Table 3(a-c), the developed model was able to explain 48% of the variance of the innovative output variable, 35% of the variance of innovative behavior, 58% of the variance of managerial support and affective commitment, and 49% of the variance of organizational support, indicating that the structural model fit was moderately and strongly confirmed. The results of Table 3(a-c) show the Q^2

TABLE 1: Descriptive statistics of research variables.

Variable	Elongation	Crookedness	SD	Mod	Middle	Mean
Innovation outputs	0.465	-0.107	0.762	3.00	3.33	3.307
Cultural support	-0.216	0.193	0.918	3.00	2.60	2.505
Innovative behavior	1.263	-0.584	0.627	4.00	3.59	3.515
Managerial support	-0.684	-0.083	0.957	3.00	3.00	2.802
Affective commitment	1.00	0.342	0.610	3.00	3.00	3.083
Organizational support	-0.610	0.202	1.010	3.00	2.66	2.526
Workplace fun	0.611	-0.154	0.627	3.00	3.00	2.951

TABLE 2: (a) Fornell and Larcker matrix and extracted root mean variance of research variables. (b) Fornell and Larcker matrix and extracted root mean variance of innovative behavior subscales. (c) Fornell and Larcker matrix and extracted root mean variance of workplace fun subscales.

(a)							
Variable	1	2	3	4	5	6	7
1	0.799***						
2	0.361***	0.837***					
3	0.682***	0.303**	0.709***				
4	0.494**	0.585***	0.418***	0.857***			
5	0.411***	0.366***	0.456***	0.345***	0.736***		
6	0.434***	0.605***	0.309***	0.762***	0.345***	0.888***	
7	0.358***	0.271**	0.511***	0.424***	0.487***	0.316***	0.709***

(b)						
Variable	1	2	3	4	5	6
1	0.885***					
2	0.622***	0.816***				
3	0.553***	0.561***	0.893***			
4	0.554***	0.505***	0.713***	0.869***		
5	0.575***	0.508***	0.604***	0.742***	0.894***	
6	0.507***	0.574***	0.575***	0.633***	0.687***	0.844***

(c)			
Variable	Colleague socializing	Constituent attachment	Admin fun
Colleague socializing	0.875***		
Constituent attachment	0.272**	0.771***	
Admin fun	0.240**	0.390**	0.810***

Noticeable: $P < 0.001^{***}$ and $P < 0.01^{**}$. (a) 1 = innovation outputs; 2 = cultural support; 3 = innovative behavior; 4 = managerial support; 5 = affective commitment; 6 = organizational support; 7 = workplace fun. (b) 1 = involve others; 2 = overcome obstacles; 3 = start affectivity; 4 = idea relation; 5 = idea search; 6 = ideation. When interpreting the Fornell and Larcker matrix, compare the values. The bold values indicate the square roots of the Average Variance Extracted (AVE) values. Ensure that the values along the main diagonal are greater than the other values in the corresponding column, as this confirms the structure's validity.

index of 0.291 for innovative output, 156.0 for innovative behavior, 401.0 for managerial support, 200.0 for affective commitment, and 371.0 for organizational support, which indicates the moderate and high predictive power of the structural model. The f^2 index also showed that the effect size of the independent variables was in the medium and high range. Finally, since the numbers on the main diameter of the Fornell and Larcker matrix (Table 2(a-c)) were more than the numbers below it, the validity of the research model was confirmed. The structural model of the research is reported as standard coefficients (PLS algorithm) and significant coefficients (bootstrapping) in Figure 2. Path coefficients (Beta) were used to determine the contribution of each of the predictor variables in explaining the variance of the criterion variable, and the significance of the path coefficients was also determined (Figure 2). According to the findings presented in Table 4 that shows factor loading of the studied variables, it can be inferred that workplace fun (WF) has a significant and positive impact on all the variables studied. In addition, innovative behavior (IB) also has a high

impact on most of the variables. Lastly, affective commitment (AC) demonstrates moderate factor loadings on certain variables.

6.5. Direct paths Model. Considering the confirmation of the goodness of fit of the model, the model fitted to the data can be presented. Next, the significance of the direct paths was examined. The path of cultural support to organizational support was statistically significant ($\beta = 0.705$, $p < 0.05$). Assuming that other variables are constant, if cultural support increases by one unit, organizational support will increase by 0.705 standard deviations. Also, the paths of organizational support to managerial support ($\beta = 0.762$, $p < 0.05$), managerial support to innovative behavior ($\beta = 0.192$, $p < 0.05$), innovative behavior to innovation outputs ($\beta = 0.678$, $p < 0.05$), workplace fun to innovative behavior, ($\beta = 0.278$, $p < 0.05$), workplace fun to affective commitment ($\beta = 0.467$, $p < 0.05$), and affective commitment to innovative behavior ($\beta = 0.248$, $p < 0.05$) were statistically significant and positive (Table 5).

TABLE 3: (a) Research model indicators and their acceptable values. (b) Model indicators and their acceptable values. (c) Workplace fun model indicators and their acceptable values.

(a)						
Variable	AVE <0.5	CR >0.7	(α) Cronbach's alpha >0.7	f^2	R^2 Weak: 0.19 Medium: 0.33 Strong: 0.67	Q^2 Weak: 0.02 Medium: 0.15 Strong: 0.35
Innovation outputs	0.638	0.841	0.717	0.869	0.465	0.279
Cultural support	0.700	0.921	0.898		0.311	0.140
Innovative behavior	0.506	0.950	0.945		0.581	0.401
Managerial support	0.735	0.917	0.879		0.272	0.136
Affective commitment	0.541	0.847	0.766		0.497	0.371
Organizational support	0.788	0.918	0.866	0.373		
Workplace fun	0.503	0.856	0.811			
(b)						
Variable	AVE <0.5	CR >0.7	(α) Cronbach's alpha >0.7		R^2 Weak: 0.19 Medium: 0.33 Strong: 0.67	Q^2 Weak: 0.02 Medium: 0.15 Strong: 0.35
Involve-others	0.784	0.916	0.862		0.585	0.434
Overcome obstacles	0.666	0.888	0.832		0.554	0.345
Start affectivity	0.797	0.922	0.873		0.678	0.510
Idea relation	0.755	0.925	0.892		0.765	0.542
Idea search	0.800	0.923	0.874		0.729	0.551
Ideation	0.712	0.881	0.797		0.651	0.439
(c)						
Variable	AVE <0.5	CR >0.7	(α) Cronbach's alpha >0.7		R^2 Weak: 0.19 Medium: 0.33 Strong: 0.67	Q^2 Weak: 0.02 Medium: 0.15 Strong: 0.35
Colleague socializing	0.766	0.942	0.924		0.604	0.427
Constituent attachment	0.595	0.887	0.831		0.603	0.326
Admin fun	0.655	0.884	0.827		0.258	0.193

6.6. Indirect Paths Model. After examining the direct paths of the model (Table 6), the indirect paths were examined. For the path of cultural support to managerial support through organizational support, a significance level was reported ($p < 0.001$), indicating that cultural support has a significant effect on managerial support through the mediator variable organizational support. Assuming that other variables are constant, if cultural support increases by one unit, managerial support will increase by 0.537 standard deviations through organizational support. Also, the organizational support and managerial support variables were able to play a mediating role in the impact of cultural support on innovative behavior. Furthermore, for the path of cultural support to innovation outputs through the mediating variables innovative behavior, managerial support, and organizational support, a significant level of p value was reported ($p = 0.05$) (Table 6), which shows that innovative behavior, organizational support, and managerial support could play a mediating role in the impact of cultural support on innovation outputs. Workplace fun had a significant effect on innovation outputs through the mediator variable innovative behavior. Finally, affective commitment and innovative behavior could play a mediating role in the impact of workplace fun on innovation outputs (Table 6).

7. Discussion

Rapid changes in global competition and the increasing demand for services from consumers make innovation essential for the survival of any organization. Due to the competitive environment of today's organizations, creating distinctive and continuous innovation by encouraging employees to generate ideas and implement ideas and innovations is one of the requirements for the success of organizations. There are effective factors for promoting the innovative behaviors of nurses in hospitals; the most effective ones are workplace fun, affective commitment, and innovative support. The main purpose of this study was to determine the relationship among workplace fun, affective commitment, innovation support, and innovative behavior. In other words, it aimed to find out how workplace fun, affective commitment, and innovation support influence innovative behavior.

Cultural support was related to organizational support and indirectly influenced managerial support through organizational support. This result was in line with the findings of Sonemz et al. [4]. Culture in organizations is the result of the relationships and interaction of the prejudices and assumptions of the founders of that organization, i.e., the sum of the common meanings and concepts between the

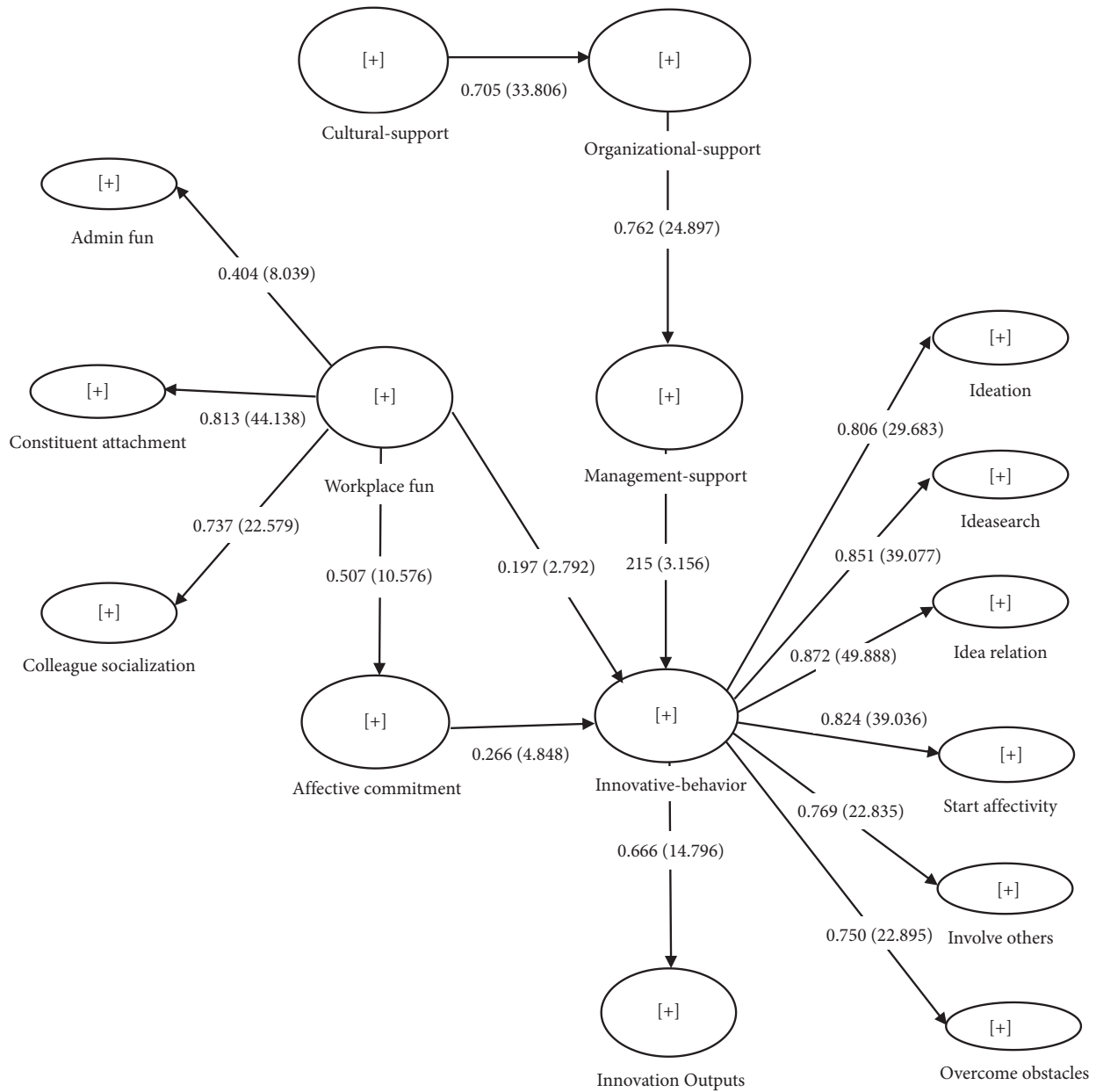


FIGURE 2: Factor-load coefficients significance of each model paths.

members of the organization. One of the dimensions of culture in organizations is giving authority and support to employees to develop their capabilities, including innovation [30]. It can be argued that cultural support in organizations means the support of the members of the organizations for governing meanings. The organizational support theory assumes that organizational support fulfills the important socioaffective needs of employees at work, such as the need for affiliation or approval, which itself leads to self-enhancement processes in them [31]. Moreover, organizational support was associated with managerial support, which confirms the results of Sonmez et al.'s study [5]. Employees who receive more organizational support, in addition to organizational commitment, show more satisfaction, productivity, and creativity, which in turn can

attract more attention and support from managers [32]. On the other hand, studies have shown that the more the employees receive better and more supportive leadership from their managers, the more organizational support they receive [33].

The results of the present study showed a relationship between managerial support and innovative behaviors, which was consistent with the study of Emiralioglu et al. [9] Managers and their support have direct and indirect effects on the culture and innovative behaviors of employees; they can exert this effect in different ways, including the effect of evaluation and reward system on innovation [34]. With the support of managers, employees can think more creatively about work-related issues and problem-solving [5]. In general, it can be said that managerial attitudes are

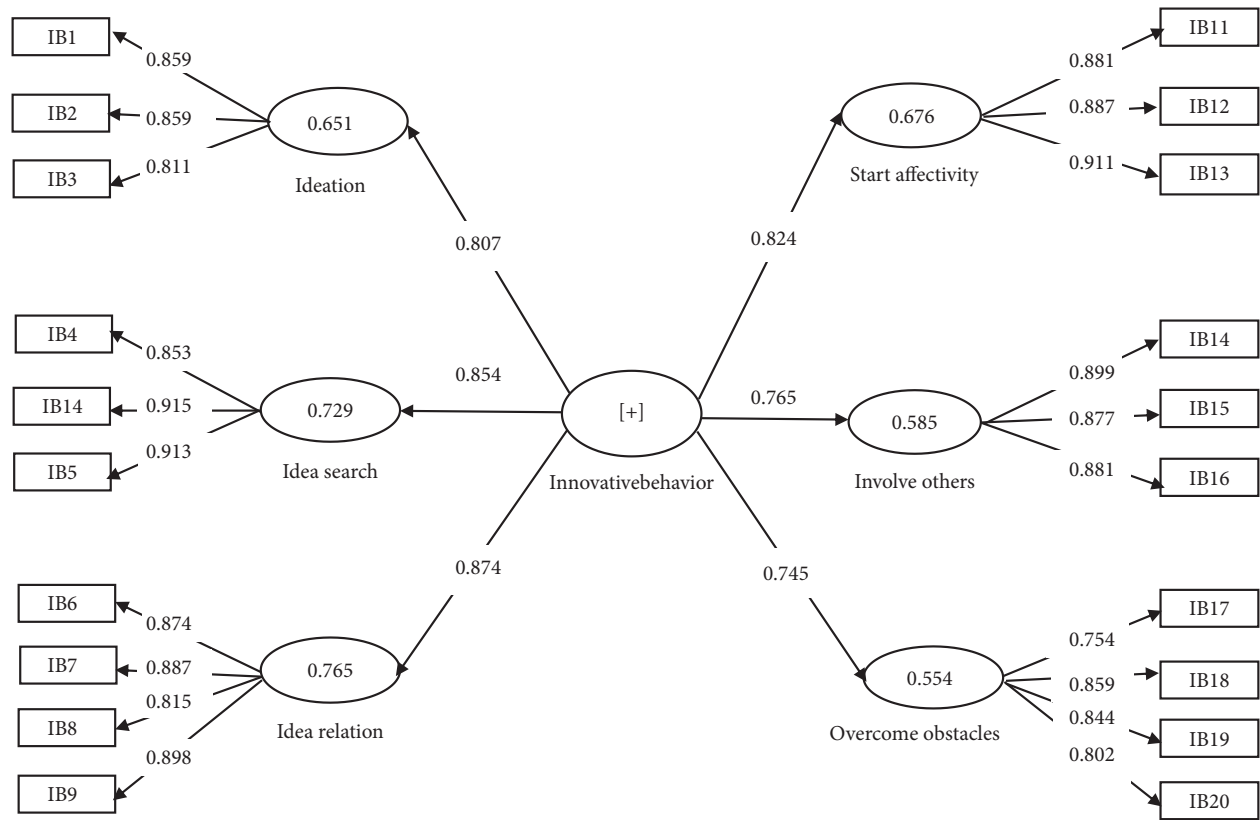


FIGURE 3: Factor-load coefficients significance of each innovative behavior's model paths.

significantly linked to innovation, and managers who encourage their employees to find new sources of knowledge inside and outside the organization experience a higher rate of innovation in their unit [34].

The results also indicated that cultural support significantly affected innovative behavior through the mediating role of managerial support and organizational support. This result was in line with the results of previous studies [3]. The results of these studies showed a relationship between managerial support and nurses' innovative behaviors. The results of other studies have revealed that the leadership style of nursing managers has a positive effect on behaviors [35, 36]. In this regard, the results of Sonmez et al.'s study [4] confirmed that nurses' innovative behaviors are influenced more by managerial innovation support, where cultural support affects organizational support and organizational support exerts an indirect effect on innovative behavior by influencing managerial support [4]. Organizations can improve innovation performance by motivating employees' innovative behavior and improving their wellbeing. They can also encourage innovation by developing innovation management systems, thereby creating a favorable environment for innovation and improving innovation performance [37].

The results also showed that cultural support significantly affected innovation outputs through the mediator variables managerial support, organizational support, and innovative behavior, which was consistent with the results of Lucas et al.'s study [3]. Through organizational support,

managers and organizations can provide support or resources to facilitate employees' efforts to create positive changes, new ideas, or innovative behaviors [38]. At the organizational level, innovation performance refers to the successful implementation of original ideas. Zhang et al. [36] confirmed that organizational culture, organizational care, and social context affect employees' innovation performance. The results of these studies confirm that organizations can improve innovation performance by encouraging employees' innovative behavior and improving their wellbeing. They can also encourage innovation by developing innovation management systems, thereby creating a favorable environment for innovation and improving innovation performance. It can be said that innovative behavior is the most effective variable involved in nurses' innovation outputs. Hence, by improving and promoting innovative behaviors, innovative outputs can be directed in positive directions.

There was a relationship between innovative behaviors and innovative output, which was in agreement with the results of Sonmez et al. [4] and Emiralioglu et al. [9]. Although employees may show many innovative behaviors, these innovative behaviors do not always show themselves as innovative output, which can also affect employees due to the work environment [9]. Therefore, managers should always try to create an environment that can bring innovative behaviors closer to innovative output in employees.

Based on the results of this research, workplace fun directly and significantly predicted innovative behaviors. It

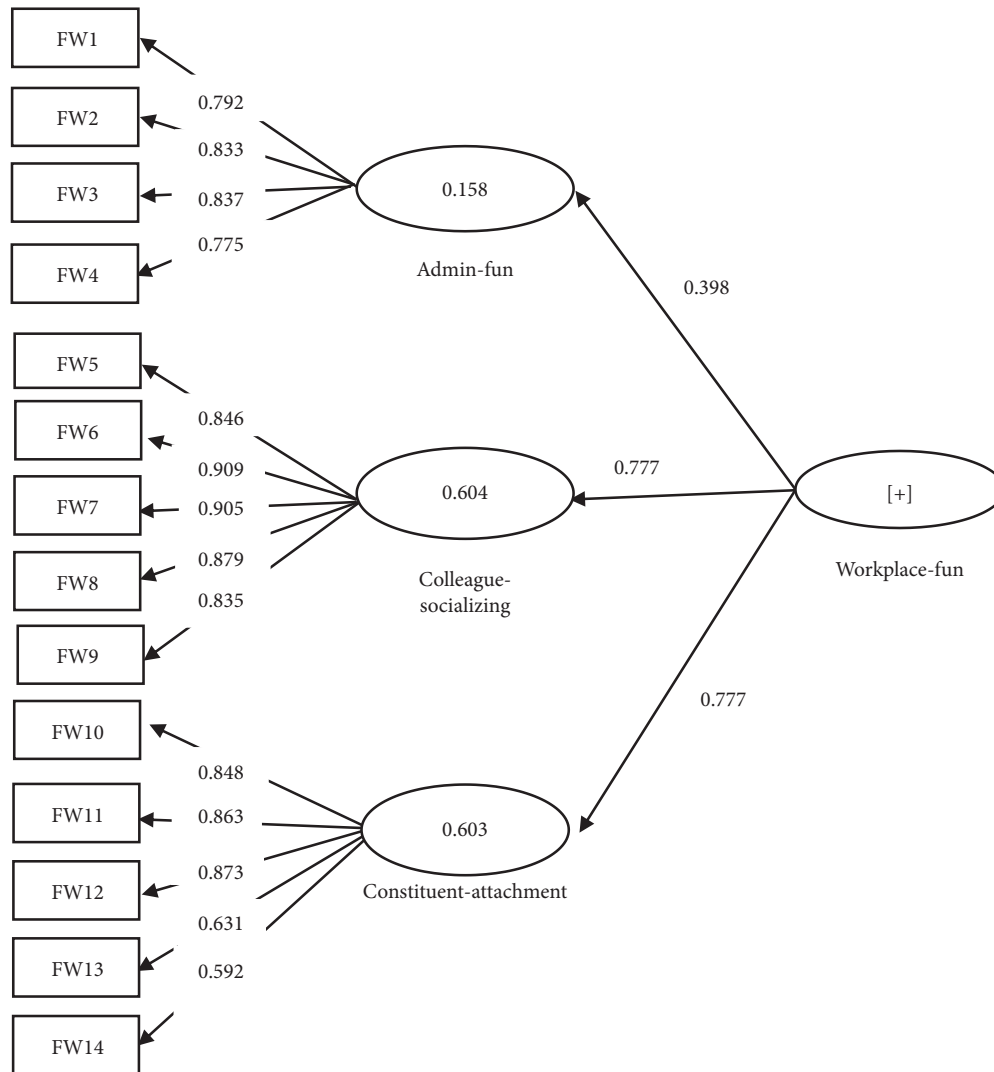


FIGURE 4: Factor-load coefficients significance of each work-place fun's model paths.

also indirectly had a significant impact on innovation outputs through innovative behavior, which was consistent with the results of Jing [1] and Michel [15]. People feel happy when they participate in fun environments, which give them the necessary motivation to face challenges. Workplace fun can also create a kind of optimism and strengthen work values for a person [39]. Employees are more committed to their jobs when they have workplace fun because it can create an atmosphere that motivates them to invest their time and energy in work and stimulates their involvement in innovative work [9].

Furthermore, fun activities can effectively improve the working environment of employees and help them show more innovative behaviors [1]. Fun is always associated with joy and happiness and can create a kind of enthusiasm and mental flexibility for employees to be at work, which in turn leads to the creation of innovative behaviors in employees. The joy of workplace fun makes employees want to do useful and productive work, use all their abilities to the fullest, and even enjoy helping others. Creating positive emotions maximizes people's energy for the development of

physical, intellectual, and social resources and helps them make efforts to create new behaviors. Finally, improving nurses' innovative behaviors will increase the quality of services provided to patients and promote more appropriate innovative outputs.

The results indicated a significant and direct relationship between workplace fun and affective commitment and between affective commitment and innovative behaviors, which was consistent with the results of Jing's study [1]. Studies have reported that unpleasant and stressful factors in the workplace, such as violence and bullying, can have direct effects on reducing the affective commitment and mental health of employees [40]. Based on the affective events theory, work events can directly lead to affective reactions and contribute to judgment-oriented behavior. People's affective orientations affect their efforts to achieve occupational goals [13]. Accordingly, the results of the present study can be because the presence of workplace fun creates this feeling in employees that they are in a suitable environment and feel emotionally united with the organization, which is more important given the effects of affective

TABLE 4: Factor loading of the studied variables.

Question	Load factors	<i>t</i> -value	Question	Load factors	<i>t</i> -value	Question	Load factors	<i>t</i> -value
FW1	0.792	9.465	IB6	0.913	73.917	IB25	0.875	55.331
FW2	0.833	9.968	IB7	0.887	54.721	IB26	0.0899	68.596
FW3	0.837	11.863	IB8	0.816	22.849	IB27	0.838	34.778
FW4	0.775	12.379	IB9	0.898	59.343	IB28	0.867	43.337
FW5	0.846	13.718	IB10	0.874	47.417	IB29	0.908	58.616
FW6	0.909	13.643	IB11	0.881	54.211	IB30	0.888	53.295
FW7	0.905	13.669	IB12	0.887	53.458	IB31	0.762	37.492
FW8	0.879	13.332	IB13	0.911	84.478	IB32	0.876	52.443
FW9	0.835	10.594	IB14	0.899	64.749	IB33	0.874	39.883
FW10	0.848	15.334	IB15	0.877	31.495	IB34	0.868	37.108
FW11	0.863	14.940	IB16	0.881	48.696	IB35	0.799	23.162
FW12	0.873	23.502	IB17	0.754	24.146	AC1	0.852	39.849
FW13	0.631	9.384	IB18	0.859	47.476	AC2	0.793	28.260
FW14	0.592	7.773	IB19	0.844	38.506	AC3	0.777	23.971
IB1	0.859	51.088	IB20	0.802	28.994	AC4	0.486	3.252
IB2	0.859	49.411	IB21	0.867	52.570	AC5	0.451	2.601
IB3	0.811	34.398	IB22	0.729	16.280	AC6	0.467	2.800
IB4	0.853	37.671	IB23	0.795	26.408	AC7	0.757	17.27
IB5	0.915	59.867	IB24	0.814	29.133	AC8	0.434	2.85

Noticeable: WF = workplace fun; IB = innovative behavior; AC = affective commitment.

TABLE 5: Direct paths model.

Direct paths	Significance level	<i>T</i> -test	Coefficient path	Result
CS → OS	$p < 0.001$	33.806	0.705	Confirmation
OS → MS	$p < 0.001$	24.897	0.762	Confirmation
MS → IB	0.005	3.156	0.215	Confirmation
IB → IO	$p < 0.001$	14.796	0.666	Confirmation
WF → IB	$p < 0.001$	2.792	0.197	Confirmation
WF → AC	$p < 0.001$	10.576	0.507	Confirmation
AC → IB	$p < 0.001$	4.848	0.266	Confirmation

Noticeable: CS = cultural support; OS = organizational support; MS = managerial support; IB = innovative behavior; IO = innovation outputs; WF = workplace fun; AC = affective commitment.

TABLE 6: Indirect paths model.

Indirect paths	Coefficient path	Sobel test	Significance-level	Result
CS → OS → MS	0.537	18.129	$p < 0.001$	Confirmation
CS → OS → MS → IB	0.116	3.039	0.002	Confirmation
CS → OS → MS → IB → IO	0.077	2.805	0.005	Confirmation
WF → IB → IO	0.131	2.792	0.005	Confirmation
WF → AC → IB → IO	0.090	4.030	$p < 0.001$	Confirmation

Noticeable: CS = cultural support; OS = organizational support; MS = managerial support; IB = innovative behavior; IO = innovation outputs; WF = workplace fun; AC = affective commitment.

commitment on healthcare providers and patients. People who have a high level of affective commitment in the organization are more productive than others and use it to creatively and innovatively solve workplace problems. Their innovative work behavior also appears as a high social exchange relationship in these people, and these people enjoy higher affective commitment [40].

In addition, nurses' affective commitment and innovative behavior had a mediating effect between workplace fun and innovation output. In the hospital work environment, nurses

participate in fun activities, enjoy the fun environment, and practice fun socializing, which can stimulate their attachment to the hospital from a personal affective perspective. This positive feeling can make nurses develop innovative behaviors for hospital performance [5]. The main goal of innovative behavior is to achieve innovative outputs. Innovation outputs are obtained when a product or method in an organization is developed by implementing new ideas or when new ideas are used by modifying existing products or methods in the organization [5].

8. Limitations

This study has a few limitations that need to be taken into account. First, the study's design was cross-sectional, meaning the findings cannot be generalized to other health organizations. Therefore, future studies should adopt longitudinal designs for better generalizability. Second, self-reporting was used to collect data for this study. However, self-reporting to evaluate innovative behavior and innovation outputs may lead to biased results, so qualitative and interventional studies are required. Lastly, this study only focused on nurses but did not consider doctors and administrators working in the same hospitals, which limits generalizability. The authors faced limitations in accessing newer versions of SmartPLS software in Iran, so they had to use version 2, which can affect statistical analysis results. Future studies should consider using the latest version to avoid software version-related limitations. In addition, considering other hospital workers in future studies can provide a deeper insight into the relationship between variables.

9. Implications for Nursing Management

By providing organizational and managerial support for nurses' innovative behaviors, managers should take measures that promote workplace fun and affective commitment to improve nurses' innovative outputs by encouraging their innovative behaviors.

10. Conclusion

Workplace fun, cultural support, managerial support, and organizational support had a positive and significant effect on nurses' innovative behaviors. In addition, workplace fun could indirectly cause innovative output behaviors in nurses through innovative behavior. Also, workplace fun using the mediating role of affective commitment and innovative behavior had a positive and significant effect on nurses' innovation output. Accordingly, supervisors and managers can adopt the organizational and managerial support approach to increase nurses' innovative behaviors. Workplace fun as a practical motivational approach can have a positive effect on nurses' attitudes, thereby enhancing their affective commitment and innovative behaviors. With the increase in innovative behaviors, the nurses' innovative outputs will also increase. For managers and practitioners dealing with the issue of innovation, a conscious understanding of innovative behaviors and innovation support factors may help them to focus on the strengths of innovation, reduce weaknesses, and manage their innovation more efficiently.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

The study was approved by the Ethics Committee of Ardabil University of Medical Sciences (number: IR.ARUMS.REC.1401.153).

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Alireza Mirzaei conceptualized, supervised, and validated the study, reviewed and edited the study, wrote the original draft, contributed to project administration, investigation, and formal analysis, conducted the methodology, and curated the data. Maryam Hashemian wrote the original draft, contributed to project administration, and curated the data. Azam Hashemian Moghadam conducted the methodology, validated the study, and contributed to formal analysis. Islam Azizpour curated the data. Mirtohid Hosseini conceptualized the study and curated the study. Maryam Hashemian and Azam Hashemian Moghadam are the co-first authors.

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Research Article

Examining Work Engagement in Integrated Nursing-Care Service Wards: Insights from Structural Equation Modeling

Ok Yeon Cho ¹, Seon-Heui Lee ² and Soyoung Yu ³

¹Graduate School, College of Nursing, Gachon University, 191 Hambakmoero, Yeonsu-gu, Incheon 21936, Republic of Korea

²College of Nursing, Research Institute of AI and Nursing Science, Gachon University, 191 Hambakmoero, Yeonsu-gu, Incheon 21936, Republic of Korea

³College of Nursing, CHA University, 120, Pocheon, Gyeonggi-do, Republic of Korea

Correspondence should be addressed to Seon-Heui Lee; sunarea87@gachon.ac.kr and Soyoung Yu; yusso2012@daum.net

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Background. In 2016, the South Korean Integrated Nursing-Care Service, covered by national insurance, was initiated, with a particular focus on cancer-oriented units. Integrated Nursing-Care Service Wards denote facilities wherein nursing professionals deliver holistic care, in the absence of paid informal caregivers (hereafter will be called caregiver). **Aim.** This study, framed within Demerouti's Job Demands-Job Resources Model, aimed to analyze variables influencing nurses' work engagement in Integrated Nursing-Care Service wards. **Methods.** From April to June 2022, 375 participants working at three certified tertiary hospitals operating Integrated Nursing-Care Service wards completed the survey. Of the 400 distributed questionnaires, 375 were used for analysis, resulting in a response rate of 93.75%. The remaining 25 questionnaires were excluded due to insufficient responses. Job demands, job resources, and personal resources were assigned as exogenous variables that predicted burnout and work engagement of nurses, while burnout and work engagement were assigned as endogenous variables. In this model, 32 hypotheses were established, and to verify the hypotheses, the direct effect of each exogenous variable on work engagement and the indirect effect through burnout as a medium were analyzed. **Results.** Burnout partially mediated the impact of exogenous variables on work engagement. The subfactors revealed partial mediation between emotional labor and work engagement, full mediation for satisfaction with the recognition from patients and caregivers, and partial mediation for resilience. **Conclusion.** Emotional labor had the highest impact on nurses' burnout in Integrated Nursing-Care Service wards, followed by resilience and satisfaction with the recognition from patients and caregivers. Nurses' burnout, work environment, emotional labor, work overload, and resilience significantly influenced their work engagement. **Implications for Nursing Management.** The results of this study are useful as basic data for research on intervention programs that reduce burnout and increase nurses' work engagement in Integrated Nursing-Care Service wards.

1. Introduction

Changes in family and social structures, such as population aging, the rise of chronic diseases, and nuclear families, are phenomena that occur in many countries worldwide [1]. In South Korea, the social activities and demands of family members have led to a trend of shifting direct care from family members to paid informal caregivers when patients are hospitalized. Caregivers help patients with their daily activities on behalf of their families or play a role in patient safety under the direction and supervision of nurses [2].

South Korea has a nursing workforce of 8.8 nurses per 1,000 people, which is 1.0 less than the Organization for Economic Co-operation and Development (OECD) average (9.8) [3]. The ratio of patients per nurse in the US is 5.3, while the ratio in South Korea is nearly 16.3 patients per nurse [4], which is still inadequate, and the burden of family caregiving and care costs continues to increase due to the lack of nursing staff and the hiring of private caregivers.

In 2013, the government expanded the nursing staff to include nurses and nursing assistants to provide nursing care to patients who were previously cared for by family members

or private paid caregivers [5]. In 2016, the government renamed the program as the Nursing and Care Integration Service and gradually expanded the initiative to include not only small- and medium-sized hospitals but also general hospitals [6]. The Integrated Nursing-Care Service is a comprehensive nursing care service that provides hospitalized patients with adequate nursing care, even if their guardians are not present, by securing adequate nursing staff, introducing a team care system, and improving the ward environment. In principle, all nursing services provided to hospitalized patients are provided by nurses and nursing assistants in medical institutions, and the system aims to improve the quality of hospitalized medical services and reduce the caregiving burden on guardians. On the patient side, providing Integrated Nursing-Care Service has led to positive changes in quality, including increased satisfaction with the high quality of care, improved intentions to return for care due to better ward environment, and decreased incidence of falls, pressure ulcers, and infections, which are patient safety indicators [7].

On the other hand, in terms of nurses, who are the mainstay of the core workforce, there are also negative aspects, such as the burden of increased workload and emphasis on the importance of nurses' role, as they are required to provide 24-hour care for patients in close proximity without a guardian or caregiver [5]. In addition, there are many cases of job stress leading to burnout among nurses in Integrated Nursing-Care Service wards due to distrust from patients and caregivers who are accustomed to receiving care from family members and caregivers and demands beyond the scope of nursing services [8]. Excessive job stress due to changes in traditional nursing duties and increased responsibilities can lead to negative work attitudes and self-concept, leading to burnout [9].

Nurse burnout negatively affects job satisfaction in the long run and reduces the quality of healthcare services provided by nurses [10]. Therefore, interventions and strategies are needed to decrease burnout and increase work engagement among nurses in Integrated Nursing-Care Service wards. Burnout refers to a state of physical, emotional, and mental exhaustion caused by chronic stress during the workday for members of an organization with frequent contact with others [11]. It can lead to job dissatisfaction and increased errors in nursing care due to formal work performance, which in turn can lead to decreased patient and caregiver satisfaction and nurse turnover [12]. Strengthening nurses' resilience is an important factor that can help them overcome the difficulties in work performance caused by burnout, and improve the quality of care. Resilience, an internal coping resource, is the ability to respond flexibly and adapt to negative factors [12], and individuals with higher levels of resilience may be able to overcome the negative effects of workplace adversity and challenges and consequently experience less burnout [13].

In contrast to burnout, work engagement refers to a positive and fulfilling attitude toward work and motivating the nursing workforce [14]. Individuals with high work engagement have a strong sense of belonging to the organization, engage in their work to seek positive feedback from

supervisors and the organization, and have a strong passion for activities outside of their role. Work engagement also affects nurses' personal resources, such as resilience and self-esteem [15].

Burnout and work engagement in nursing can also be explained by the Job Demands-Resources model (JD-R model), which explains burnout and work engagement from an organizational perspective rather than an individual perspective and divides job-related factors into job demands and job resources. Xanthopoulou et al. [16] extended the JD-R model by adding personal resources to it. Later, Keyko et al. [17] extended the model to develop the Nursing Job Demands-Resources (NJD-R) model applicable to professional nursing practices. According to their findings, work engagement exists in the organizational environment and at the work level, and the positive outcomes of work engagement can improve performance for the organization, increase value for the nurses, and decrease negative outcomes within the healthcare organization. The NJD-R model, derived from this research, suggests opportunities to promote nurses' work engagement, providing a foundational framework for understanding nursing practice, conducting direct nursing research, and guiding practices and policies [17].

Therefore, this study aimed to identify the effects of burnout and work engagement on nurses in Integrated Nursing-Care Service wards and explore ways to decrease burnout and increase work engagement in Integrated Nursing-Care Service wards by identifying factors that affect work engagement through the mediation of burnout and identifying pathways between factors. In this study, burnout was examined as an outcome influenced by various job demands and resources. This perspective is crucial as it allows us to understand how burnout impacts job satisfaction and the quality of healthcare services. By treating burnout as a result, we can better analyze its underlying causes and develop strategies to mitigate its effects on healthcare professionals and the care system as a whole.

2. Materials and Methods

2.1. Design and Sampling. This is a descriptive research study based on the JD-R model (Figure 1). It consists of seven exogenous variables (role conflict and role ambiguity, emotional labor, work overload, professional autonomy, nurses' work environment, satisfaction with the recognition from patients and caregivers, and resilience) and two endogenous variables (burnout and work engagement), with burnout as a parameter. In this context, "burnout as a parameter" means that burnout is used as an intermediary variable that mediates the relationship between the exogenous variables and the endogenous variables. This mediating role allows us to examine how burnout influences the impact of these variables on work engagement. The paths between the variables were hypothesized to be role conflict and role ambiguity, emotional labor, work overload, professional autonomy, nurses' work environment, satisfaction with the recognition from patients and caregivers, resilience affecting burnout and work engagement, and burnout affecting work engagement.

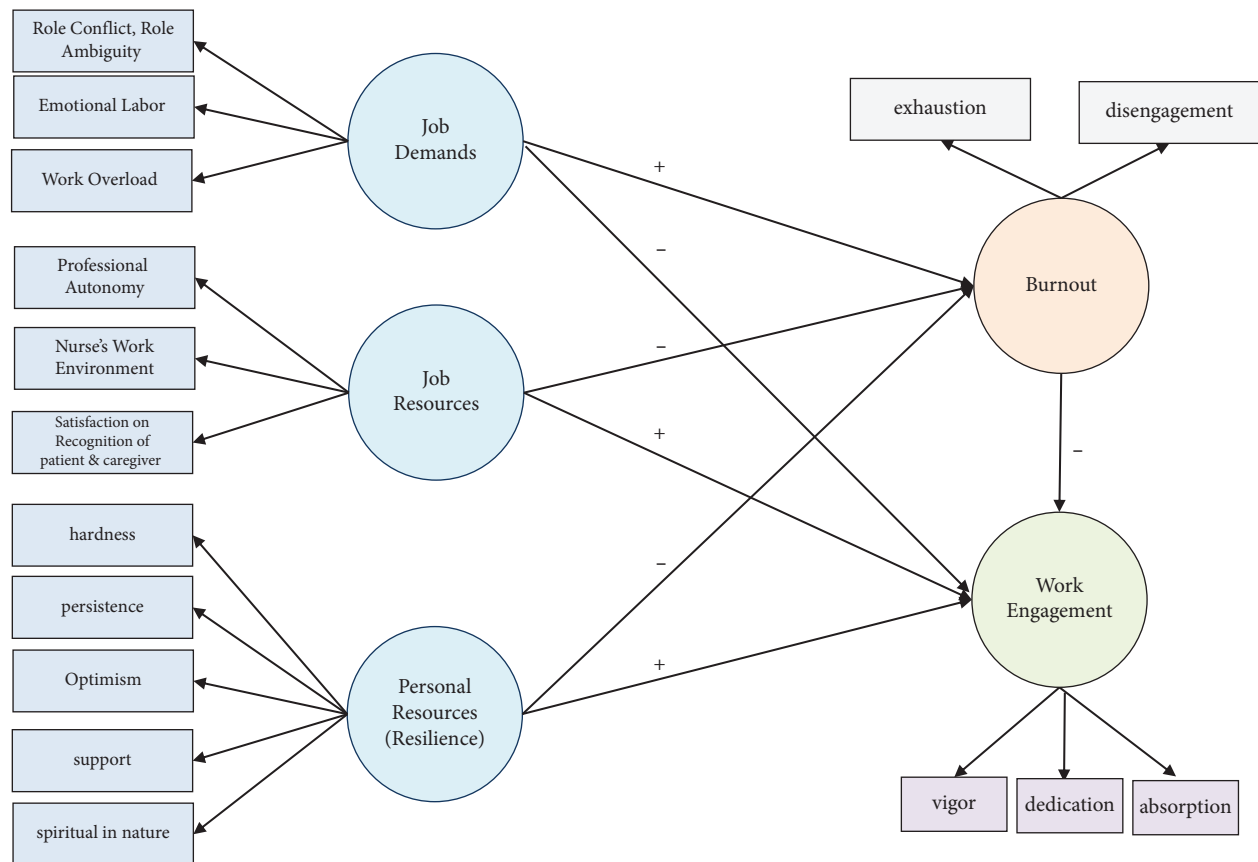


FIGURE 1: The conceptual map of study variables.

2.2. Data Collection. Data were collected from April 27 to June 24, 2022, from nurses with at least 1 year of work experience in three tertiary general hospitals and who experienced similar levels of work intensity in Integrated Nursing-Care Service wards in Incheon and Bucheon, South Korea, and understood the purpose of the study and agreed to participate. After obtaining prior consent from the head of the nursing department of the hospital, the researcher sought cooperation from the head nurse of the ward, explained the purpose of the study, obtained written consent, and administered the questionnaire. To reduce sampling errors in structural equations, a sample size of 200–400 is required, regardless of the size of the model [18]. Accordingly, 400 questionnaires were distributed, and 375 questionnaires were analyzed after excluding those who responded dishonestly.

2.3. Measures. Participant characteristics included age, gender, education, position, clinical experience, experience in Integrated Nursing-Care Service wards, and length of service in Integrated Nursing-Care Service wards.

Job demands included role conflict and role ambiguity, emotional labor, and work overload; job resources were professional autonomy, nurses' work environment, satisfaction with the recognition from patients and caregivers; personal resources were resilience; and endogenous variables were burnout and work engagement.

2.3.1. Job Demands

(1) *Role Conflict and Role Ambiguity.* The questionnaire developed by Rizzo and Lirtzman [19] and adapted by Kim [20] has a total of 10 questions rated on a 5-point Likert scale, with higher scores indicating higher role conflict and role ambiguity. In this study, the reliability of role conflict was Cronbach's α 0.81, and the reliability of role ambiguity was Cronbach's α 0.79.

(2) *Emotional Labor.* Emotional labor refers to the process of managing feelings and expressions to fulfill the emotional requirements of a job [21]. It includes factors such as the frequency of emotional expression, caution in emotional expression, and emotional dissonance, measured by a tool developed by Kim [22] based on the research of Morris and Feldman [21]. The tool comprises a total of nine subfactors, including three questions each on the frequency of emotional expression, caution in emotional expression, and emotional dissonance. Participants rated these subfactors on a 5-point Likert scale, with higher scores indicating elevated levels of emotional labor. The reliability of the tool in this study was assessed using Cronbach's alpha, yielding a value of 0.83.

(3) *Work Overload.* The work overload measure, a component of the Work-Job Demands subscale within the Questionnaire on the Experience and Evaluation of Work

(QEEW) 2.0 tool, was developed by Van Veldhoven et al. [23] and translated by Lim [24]. This measure consists of six questions, and participants rate their responses on a 4-point Likert scale. Higher scores on this scale indicate a greater perception of work overload. The reliability of the tool in this study was assessed using Cronbach's alpha, yielding a value of 0.88.

2.3.2. Job Resources

(1) *Professional Autonomy.* The Professional Autonomy Scale developed by Schutzenhofer [25], adapted by Han [26], and modified by Kim [27] has a total of six questions rated on a 5-point Likert scale, with higher scores indicating higher levels of professional autonomy. The reliability of this study was Cronbach's α 0.76.

(2) *Nurses' Work Environment.* The Korean Work Environment Scales for Clinical Nurses (KWES-CN), developed by Kim et al. [28] and modified and supplemented by Shim [29], have a total of 18 questions rated on a 4-point Likert scale, with higher scores indicating a better nurses' work environment. The reliability of this study was Cronbach's α 0.86.

(3) *Satisfaction with Recognition from Patients and Caregivers.* The Job Satisfaction Tool developed by Paula et al. [30], translated by Han et al. [26], and used by Park [31] and the Volunteer Satisfaction Tool of Choi [32] reorganized, modified, and supplemented by Shim [29] have a total of five questions rated on a 5-point Likert scale, with higher scores indicating higher satisfaction with the recognition from patients and caregivers. The reliability of this study was Cronbach's α 0.87.

2.3.3. Personal Resources

(1) *Resilience.* The Connor–Davidson Resilience Scale (CD-RISC), developed by Connor and Davidson [33] and adapted and validated by Baek [34] as the K-CD-RISC, has a total of 25 questions rated on a 5-point Likert scale, with higher scores indicating higher resilience. CD-RISC indeed provides subscales, measuring resilience through five distinct factors: hardiness, persistence, optimism, support, and spirituality [34]. Each subscale is assessed through specific items on the scale. Hardiness reflects the ability to endure difficult conditions. Persistence indicates the capacity to continue despite adversity. Optimism measures a general positive outlook on life and the future. Support evaluates the perceived availability of social support, and spirituality captures a sense of purpose and faith in something greater. The reliability of this study was Cronbach's α 0.92.

2.3.4. *Burnout.* The Oldenburg Burnout Inventory (OLBI), developed by Demerouti and Nachreiner [35] and translated by Choi [36], has a total of six questions rated on a 5-point Likert scale, with higher scores indicating higher levels of burnout. The reliability of this study was Cronbach's α 0.76.

2.3.5. *Work Engagement.* Work engagement is defined as a positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption [37]. It is measured using the Dutch Utrecht Work Engagement Scale (UWES-9). The Dutch Utrecht Work Engagement Scale (UWES-9), developed by Schaufeli et al. [37] and translated by Baek [38], has a total of nine questions rated on a 7-point Likert scale, with higher scores indicating higher work engagement. The reliability of this study was Cronbach's α 0.91.

2.4. *Data Analysis.* Descriptive statistics and Pearson's correlation coefficient analysis were conducted using SPSS 25.0, and the fitness of the hypothetical model, path coefficient, and effect were verified using AMOS 23.0.

To verify the suitability of the model, absolute fit indices (χ^2 , χ^2/df), root mean square residual (RMR), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), root mean square error of approximation (RMSEA), Tucker–Lewis index (TLI), and comparative fit index (CFI) were used for the analysis.

The significance of the path coefficient of the structural model was verified using the unstandardized coefficient (B), standardized coefficient (β), standard error (SE), and p value, and the explanatory power of the endogenous variables was confirmed using square multiple correlation (SMC).

2.5. *Ethical Considerations.* After obtaining approval from the Institutional Review Board of Gachon University (IRB approval number: 1044396-202201-HR-027-01), written consent was obtained from all the participants, and the study contents were explained to them. The written consent form included information on the purpose of the study, data collection methods, autonomy to participate in or withdraw from the study, confidentiality of information and interests, discomfort, and time required to complete the questionnaire. A self-administered questionnaire was administered to those who voluntarily agreed to participate in writing. All the nurses who participated in the study were offered a small gift as a token of appreciation.

3. Results

3.1. *General Characteristics.* The average age of the nurses was 29.90 years (± 6.32), approximately 95.7% of the total sample was female, and four-fifths of the nurses had a bachelor's degree in nursing. More than 80% of the positions were general nurses, with an average clinical experience of 7.32 (± 6.76) years, 107 (35.7%) had 1–2 years of experience in nursing and Integrated Nursing-Care Service wards, 150 (50.0%) had 3–5 years of experience, and 43 (14.3%) had more than 6 years of experience in nursing and Integrated Nursing-Care Service wards, and the average number of years of experience in nursing and integrated care units was 3.33 (± 1.62) (Table 1).

3.2. *Validation Results of the Research Model.* The proposed structural model proved to be a very good fit with $\chi^2 = 566.031$ ($df = 265$), $\chi^2/df = 2.136$. The GFI was 0.894,

TABLE 1: General characteristics of the participants ($N = 375$).

Characteristics	Category	<i>n</i>	%
Gender	Male	16	4.3
	Female	359	95.7
Age (years)	20–29	247	60.9
	30–39	87	23.2
	40–49	34	9.1
	≥50	7	1.9
Education	Associate bachelor	18	4.8
	Bachelor	322	85.9
	Master	30	8.0
	Others	5	1.3
Religion	Yes	137	36.5
	No	238	63.5
Marital status	Married	91	24.3
	Single	284	75.7
Position	Staff nurse	312	83.2
	Charge nurse	53	14.1
	Head nurse	10	2.7
Department	Medicine ward	203	54.1
	Surgical ward	172	45.9
Total clinical experience (years)	1–<5	194	58.6
	6–<10	63	19.0
	11–<15	29	8.8
	16–<20	21	6.3
	21≤	24	7.3
Experience in Integrated Nursing-Care Service wards (years)	1–<2	107	35.7
	3–<5	150	50.0
	6≤	43	14.3

AGFI was 0.849, TLI was 0.919, CFI was 0.939, RMR was 0.029, and RMSEA was 0.055, showing very high fit (Figure 2).

The variable with the greatest impact on nurses' burnout in Integrated Nursing-Care Service wards was emotional labor, followed by resilience and satisfaction with the recognition from patients and caregivers. Burnout was the most variable influencing nurses' work engagement in Integrated Nursing-Care Service wards, followed by nurses' work environment, emotional labor, work overload, and resilience (Table 2).

3.3. Results of Verification of Significance of Mediating Effect. Regarding the mediating effects, emotional labor, satisfaction with the recognition from patients and caregivers, and resilience had a significant effect on burnout. Regarding work engagement, emotional labor, work overload, and nurses' work environment had a significant effect on work engagement. Moreover, resilience and burnout had a significant effect on work engagement.

The indirect effects' results showed that burnout partially mediated the relationship between emotional labor and work engagement, fully mediated the relationship between satisfaction with the recognition from patients and caregivers and work engagement, and partially mediated the relationship between resilience and work engagement (Table 3).

4. Discussion

This study analyzed the factors affecting nurses' burnout and work engagement based on Xanthopoulou et al.'s [16] extended Job Demands-Job Resources model. The results of the structural model analysis confirmed that job demands, job resources, and personal resources affected burnout and work engagement. In addition, the proposed structural model, based on the upper and lower factors, showed a high degree of fit, confirming its high explanatory power. Based on these findings, we discuss the following points.

4.1. Factors Influencing Nurses' Burnout in Integrated Nursing-Care Service Wards. First, job demands had a positive effect on burnout. In particular, emotional labor had a significant effect on burnout, which is consistent with the findings of Kim et al. [39], Kim [40], and Hyun and Lee [41]. Emotional labor is common in interactive nursing work and can lead to increased burnout. Therefore, intervention programs and educational measures to reduce nurses' emotional labor are needed. Second, job resources of nurses in Integrated Nursing-Care Service wards had a negative effect on burnout. In particular, satisfaction with the recognition from patients and caregivers affected burnout. Patient and guardian recognition is an important variable nationwide related to the expansion of integrated nursing-care services. To improve this situation, publicity programs

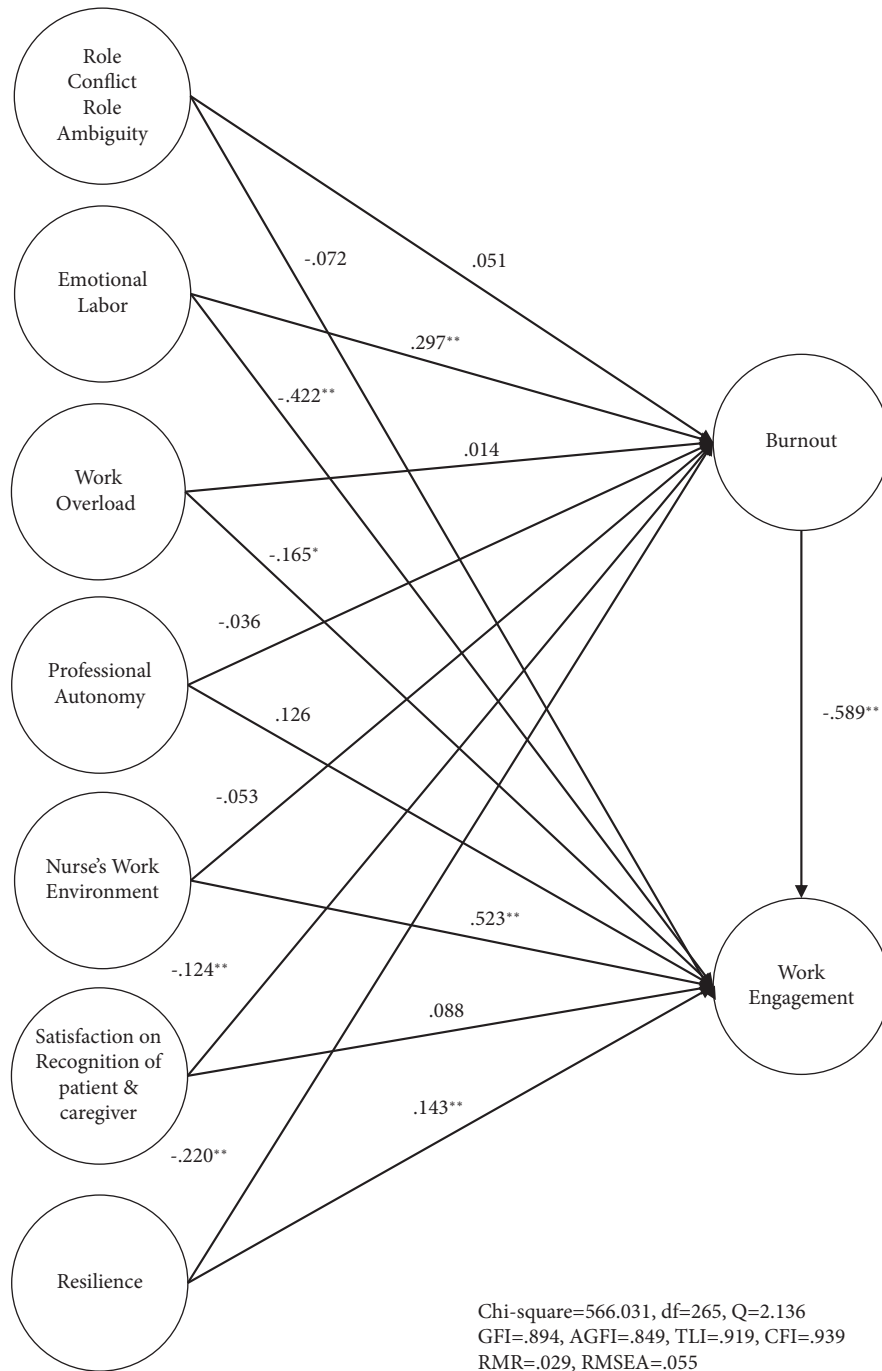


FIGURE 2: Structural equation modeling of the research model. * $p < 0.05$; ** $p < 0.01$.

are needed to increase awareness and provide information about social nursing services. Third, resilience, a personal resource, had a negative effect on burnout, which is consistent with the findings of Kim [42], Yang and Gu [15], and Hyun and Lee [41]. As nurses' resilience is an acquired factor shaped by their personalities and stress management skills, a personal approach and organizational support are needed. It is necessary to develop various programs and provide stress management training to increase nurses' personal resilience and communication.

4.2. Factors Influencing Nurses' Work Engagement in Integrated Nursing-Care Service Wards. First, job demands of nurses in Integrated Nursing-Care Service wards had a negative effect on work engagement. In Choi's [43] study, a negative relationship between job demands and work engagement was reported, and among the subfactors, emotional labor and work overload had a negative effect on work engagement. The effects of emotional labor and workload on work engagement were reported in many domestic and international studies. As there is a lack of

TABLE 2: Summary of the test results for the hypotheses based on the research framework

Path	Standardized coefficients	Unstandardized coefficients	Standard error	t	p	SMC (%)	Hypothesis supported
RC, RA → burnout	0.051	0.060	0.144	0.417	0.676	73.7	No
EL → burnout	0.297	0.354	0.120	2.950**	0.003		Yes
WO → burnout	0.014	0.015	0.100	0.150	0.881		No
PA → burnout	-0.036	-0.040	0.057	-0.702	0.483		No
NWE → burnout	-0.053	-0.057	0.151	-0.377	0.706		No
SRPC → burnout	-0.124	-0.132	0.041	-3.220**	0.001		Yes
Resilience → burnout	-0.220	-0.242	0.063	-3.841**	0.000		Yes
RC, RA → WE	-0.072	-0.078	0.379	-0.206	0.837	85.7	No
EL → WE	-0.422	-0.454	0.159	-2.855**	0.005		Yes
WO → WE	-0.165	-0.179	0.077	-2.325*	0.021		Yes
PA → WE	0.126	0.135	0.149	0.906	0.366		No
NWE → WE	0.523	0.539	0.183	2.945**	0.003		Yes
SRPC → WE	0.088	0.095	0.160	0.594	0.553		No
Resilience → WE	0.143	0.150	0.053	2.830**	0.005		Yes
Burnout → WE	-0.589	-0.614	0.188	-3.266**	0.001		Yes

$\chi^2 = 566.031$ ($p = 0.000$), $df = 265$, $Q = 2,136$
 GFI = 0.894, AGFI = 0.849, TLI = 0.919, CFI = 0.939, RMR = 0.029, RMSEA = 0.055 (90% CI = [0.049–0.061])

RC, role conflict; RA, role ambiguity; EL, emotional labor; WO, work overload; PA, professional autonomy; NWE, nurses' work environment; SRPC, satisfaction with the recognition from patients and caregivers; WE, work engagement. ** $p < 0.01$; * $p < 0.05$.

TABLE 3: Result of verifying significance of mediating effects on factors.

Path	Total effect	Direct effect	Indirect effect
RC, RA → burnout	0.051	0.051	
EL → burnout	0.297**	0.297**	
WO → burnout	0.014	0.014	
PA → burnout	-0.036	-0.036	
NWE → burnout	-0.053	-0.053	
SRPC → burnout	-0.124**	-0.124**	
Resilience → burnout	-0.220**	-0.220**	
RC, RA → WE	-0.102	-0.072	-0.030
EL → WE	-0.597**	-0.422**	-0.175*
WO → WE	-0.173*	-0.165*	-0.008
PA → WE	0.147	0.126	0.021
NWE → WE	0.554**	0.523**	0.031
SRPC → WE	0.161*	0.088	0.073*
Resilience → WE	0.273**	0.143**	0.130*
Burnout → WE	-0.589**	-0.589**	

RC, role conflict; RA, role ambiguity; EL, emotional labor; WO, work overload; PA, professional autonomy; NWE, nurses' work environment; SRPC, satisfaction with recognition from patients and caregivers; WE, work engagement. ** $p < 0.01$; * $p < 0.05$.

research on this topic, it is necessary to explore the relationship between job demands and work engagement in the special environment of nurses in Integrated Nursing-Care Service wards. Second, job resources had a positive effect on nurses' work engagement in Integrated Nursing-Care Service wards. The effect of nurses' work environment on work engagement was reported in previous studies; if nurses are fully aware of and satisfied with their job resources, they are more likely to experience positive work engagement. Therefore, efforts should be made to improve nurses' work environment and increase their awareness of job resources. Third, personal resources had a positive effect on work engagement. The greater the resilience, the higher the work engagement, which is consistent with the findings of Moon et al. [44] and Jang [45]. The effect of resilience on work engagement was confirmed in various studies, and recent studies related to the COVID-19 response showed that resilience plays an important role in the work experience of nurses. Therefore, programs aimed at improving resilience are needed to manage work engagement among nurses in Integrated Nursing-Care Service wards. Based on these findings, in order to effectively manage job burnout among nurses in Integrated Nursing-Care Service wards, efforts should be made to improve job demands, reduce emotional labor and work overload, and enhance job resources by improving nurses' work environment. In addition, programs aimed at enhancing nurses' personal resilience should be actively developed at the hospital organizational level.

4.3. Mediating Effects of Nurses' Burnout in Integrated Nursing-Care Service Wards. The structural model based on superordinate and subordinate factors confirmed the mediating effect of burnout on the relationship between job demands, job resources, and personal resources. Particularly, emotional labor and resilience had a partial mediating

effect of burnout on subordinate factors, whereas satisfaction with the recognition from patients and guardians showed a full mediating effect. First, regarding the relationship between emotional labor and burnout, burnout showed a partial mediating effect, consistent with the findings of Shim [29], as nurses, especially in Integrated Nursing-Care Service wards, have more direct contact with patients, and the burden of emotional labor is greatly felt in the process of hiding their emotions and always treating them in a friendly manner to meet patients' and guardians' expectations of integrated nursing-care services. As a result, nurses are likely to experience burnout due to emotional labor, which affects their job enthusiasm. Therefore, emotional labor needs to be managed in Integrated Nursing-Care Service wards, and intervention programs are needed. Second, satisfaction with the recognition from patients and guardians showed a full mediating effect of burnout in its relationship with job commitment, which is different from the findings of Shim [29], where satisfaction with the recognition from patients and guardians did not directly affect job commitment but indirectly affected burnout. In this study, satisfaction with the recognition from patients and guardians in Integrated Nursing-Care Service wards mediated the relationship between burnout and work engagement, suggesting that good communication and interaction with patients and guardians, along with measures to reduce burnout, play an important role in mitigating work engagement. Third, resilience had an indirect effect on work engagement, and burnout mediated the effect of resilience on work engagement. Although the results of this study differ from those of previous studies, resilience seems to play a role in mitigating burnout and reducing work engagement depending on the characteristics of Integrated Nursing-Care Service wards.

Therefore, programs to enhance nurses' resilience and measures to manage burnout should be implemented. These findings suggest the need for intervention programs and organizational improvements that take into account the work characteristics of nurses in Integrated Nursing-Care Service wards, especially emotional labor, satisfaction with the recognition from patients and caregivers, and resilience. In doing so, we should focus on decreasing nurses' job burnout and increasing their overall job satisfaction.

4.4. Limitations. As this study was limited to nurses in tertiary hospitals, the results should be interpreted with caution, and it is recommended that the study be repeated considering the size of the hospital and various organizational characteristics.

5. Conclusions

This study used the JD-R model to examine the factors affecting burnout and work engagement among nurses in Integrated Nursing-Care Service wards. The structural model analysis substantiated the significant influence of job demands, job resources, and personal resources on both burnout and work engagement, affirming the robust fit of

the proposed model and its applicability to nurses in specific healthcare settings. This study underscores the need for targeted interventions to address burnout management and enhance job enthusiasm among nurses. The key determinants of nurses' work engagement include burnout, nurses' work environment, emotional labor, work overload, and resilience. Notably, heightened emotional labor correlated with increased burnout. This study provides an effective framework for further research, particularly for the development of intervention programs aimed at improving nursing care quality and optimizing workforce management.

5.1. Implications for Nursing Management. This study represents a singular endeavor to substantiate a structural model that delineates the factors influencing the professional commitment of nurses working in Integrated Nursing-Care Service wards. The validated model serves as a pragmatic foundation for the formulation and assessment of nursing interventions in hospitals. Nursing management should prioritize the cultivation of a conducive work milieu, emphasizing the reinforcement of nurses' roles in hospitals. Furthermore, organizational support for initiatives targeting the amelioration of stress and burnout among nurses, coupled with enhancing individual resilience, is recommended for hospitals.

Data Availability

Data supporting the findings of this study are available upon request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethical Approval

Data collection began after ethical approval was obtained from the Institutional Ethics Committee (IRB no. 1044396-202201-HR-027-01) of Gachon University.

Conflicts of Interest

The authors declare no conflicts of interest related to funding, writing, editing, approval, or the decision to publish the manuscript.

Authors' Contributions

SHL designed and conducted the study, supervised data collection, administered the project, and performed data analysis, interpretation, and writing of the original manuscript. OYC designed the study, performed data analysis and interpretation, and contributed to the writing of the manuscript. SY contributed to the interpretation of data and writing of the manuscript. OYC curated the data and performed the formal analysis. OYC and SY designed the methodology. SHL and SY supervised the study. SHL, OYC, and SY validated the study and reviewed and edited the manuscript. All authors have read and approved the final manuscript.

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Research Article

Exploring Bystander Behavior Types as a Determinant of Workplace Violence in Nursing Organizations Focusing on Nurse-To-Nurse Bullying: A Qualitative Focus Group Study

Kyoungja Kim ¹, Scott Seung Woo Choi ¹ and Cheongin Im ²

¹Department of Nursing, College of Medicine, Inha University, Incheon, Republic of Korea

²School of Nursing, The University of Texas at Austin, Austin, TX, USA

Correspondence should be addressed to Kyoungja Kim; asteria43@inha.ac.kr

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Aim. This study explored and analyzed the characteristics of bystander types of workplace violence in hospital nurses experiencing horizontal (nurse-to-nurse) violence. The primary research question was “What are the behavioral patterns of bystander types in peer-to-peer violence situations among hospital nurses?”. **Background.** Workplace violence is a result of environmental and structural conflicts, rather than deviant individual perpetrators. Research examining workplace violence suggests that bystanders are not merely witnesses of acts of aggression but can play a substantial role in escalating or deflecting violence. Types of bystander influence power dynamics within a group, resulting in changes in the pattern of violence. **Methods.** Employing a qualitative design, this study conducted focus group interviews with nurses from three tertiary hospitals. The qualitative data collected was analyzed using inductive and qualitative content analysis methods. **Results.** Nine focus group interviews ($n = 26$) were conducted on bystanders’ experiences of workplace violence. A total of 185 analysis units were identified and categorized into three main themes, based on their impact on workplace violence (reinforcing, avoiding, and suppressing) with six subcategories (facilitative reinforcer, diffuse reinforcer, condoning avoider, powerless avoider, empathic suppressor, and interventional suppressor). **Conclusions.** This study delineates a typology of bystander roles in workplace bullying/horizontal violence among nurses, identifying three distinct types of bystanders. The outcomes of workplace violence vary, based on the type of bystander involved as well as the dynamics among bystanders, perpetrators, and victims. **Implications for Nursing Management.** Nursing organizations should educate nurses about the concept of bystanders as this will help nurses understand that even if they may not be perpetrators or victims of workplace violence, they are still implicated as bystanders. Additionally, nursing organizations and leaders should empower nurses to play a positive bystander role.

1. Introduction

Workplace violence between coworkers is defined as “an act of causing another employee physical or mental harm or degrading the working environment by taking advantage of one’s position or relationship in the workplace beyond the scope appropriate for work” [1]. Workplace violence typically targets a particular person, has clear intentions, is recurrent and ongoing, is likely to last for various time periods, and causes long-term job stress [2]. Globally, the prevalence of workplace violence in healthcare is as high as 87.4% [3], with 67.3% and 64.9% of health-care institutions

reporting incidents of workplace violence in North America and Asia, respectively [4]. In Canada, approximately one-third of nurses with less than three years of experience are exposed to workplace violence weekly or daily [5]. The frequency of workplace violence increased during the COVID-19 pandemic [6], making it a prevalent and serious issue in hospital settings.

Workplace bullying among nurses is a critical problem and a significant risk factor that aggravates patient safety in clinical fields. According to previous studies, workplace violence can lead to more frequent medication errors, communication impairment, and lower quality of care

[7–10]. More directly, workplace violence among hospital nurses impairs their physical and psychological health and leads to increased turnover [7–10]. Given the crucial negative consequences of workplace violence, global concerns about workplace violence in clinical settings are gathering attention. Studies have shown that workplace violence can be aggravated not only by the perpetrator's personal disposition and characteristics but also by work environmental factors, such as heavy nursing workload and ineffective systems [11, 12]. Therefore, some aspects of workplace violence should be considered the result of environmental and structural conflicts rather than individual perpetration. Another significant characteristic of workplace violence in nursing context is that most nurses are aware of its existence [13], making it a group issue [10, 14].

In violent situations within a social group, especially between coworkers, the majority often act as witnesses rather than being directly involved as victims or perpetrators. In such social violence scenarios, the negative consequences extend beyond just the victim and perpetrator to also affect the witnesses. In a study examining university students' responses to violent situations on campus, most witnesses felt unsafe and experienced negative consequences from the violence [15]. In nursing contexts, similar phenomena occur when individuals witness violent situations. In Báez-León and colleagues' work [16], most nurses reported feeling uncomfortable and nervous during violent situations, even though they were neither victims nor perpetrators [16]. These negative consequences of violence have been referred to as ripple effects [17] or covictimization [18]. In one previous study, approximately 22% of nurses who witnessed workplace violence considered resigning from their nursing job [17]. Therefore, workplace violence is not solely a dyadic problem involving victim and perpetrator but also a triadic issue that includes witnesses.

Bystanders encompass more than just witnesses or observers; they are individuals who, as members of a social group, can choose their own behavior in response to violence occurring within the social group [18]. In school violence, bystanders are classified as assistants, reinforcers, outsiders, and defenders [19] and further subdivided into bully, puppet-master, victim, avoidant, abdicator, sham, and helpful bystander [20]. Paull et al. [18] classified bystanders of workplace violence into constructive and destructive types and further subdivided them into 13 types depending on whether they were active or passive: instigating, manipulating, collaborating, facilitating, abdicating, avoiding, succumbing, submitting, empathizing, intervening, defusing, sympathizing, and defending.

Bystander in social groups plays a key role because violence patterns can be influenced by the predominant bystander type [18], which in turn affects the power dynamics within the group [18, 21]. For instance, facilitators, such as assistants or reinforcers, encourage and participate in violence by the perpetrator [22], thereby reinforcing the frequency and intensity of the violence [16, 23, 24]. In contrast, victim advocacy types, such as defenders, have a positive effect by supporting the victim and inhibiting the perpetrator's violence [22]. Abdicating types, such as outsiders,

ignore or avoid violent situations, resulting in increased isolation for the victim within the organization [18, 22, 25].

However, there is a lack of studies on bystanders of workplace violence in hospital nursing settings [14]. This gap may persist in part due to the long-standing social tolerance of excessive tension and interpersonal power imbalances within hospital nursing organizations. At times, these aggressive customs are deliberately utilized to immerse novice nurses in the organizational culture [26]. The tolerance for and complicity of nursing organizations in violent situations often render nurse silent witnesses to such incidents in workplace because they accepted it as a norm; nurses may perceive such behavior as the norm within the collective nurse workgroup, thereby normalizing workplace violence as part of their socialization process [27]. In the same vein, some argue that workplace violence among nurses correlates with either the victim's perceived lack of work competence [28] or the characteristics of the nursing organization [29], invoking the oppressed group theory. In this context, nurses may find it easy to witness workplace violence without intervening, as they have not been adequately supported to adopt any role other than that of an abdicator [30]. Moreover, they have never been trained to effectively intervene as appropriate bystanders and address instances of violence [31].

Thus, further research is needed to establish a foundational understanding of how bystander types within nursing organizations differ from those observed in other social groups. In cases of peer-to-peer violence in nursing workplaces, bystanders influence each other's behavior [18, 22]. Additionally, considering that witnessing violence in the workplace is common in clinical settings, more transparent and detailed qualitative data can be gathered more appropriately through group interviews than in one-on-one interviews. Empirical research suggests that focus groups may provide more appropriate settings to elicit sensitive personal information than individual interviews [32]. Thus, in this study, we employed the focus group interview method to facilitate participants with shared experiences to engage in in-depth discussions on the given topic and to share their diverse perspectives through mutual interaction [33]. Therefore, this study aimed to explore and analyze the characteristics of bystander types of workplace violence between hospital nurses in clinical settings. The research question was "What are the behavioral patterns exhibited by bystander types in instances of workplace violence between hospital nurses in clinical settings?"

2. Materials and Methods

2.1. Research Design. We adopted a qualitative study design using focus group interviews and qualitative content analysis to explore the types and characteristics of bystanders of workplace violence between hospital nurses.

2.2. Research Participants. The study population comprised clinical nurses working in general tertiary hospitals. Morgan [33] suggested a total of 18 research participants in three

groups, with a maximum of six people per group, for general focus group interview research. However, during the data collection period in 2021, the national quarantine guidelines for COVID-19 in Korea permitted only small group gatherings of five or fewer people. Consequently, with a research team consisting of two individuals, the plan was to have three research participants per group, totaling six groups. Considering a 20% dropout rate due to the COVID-19 pandemic, the target sample size was 22 nurses.

The inclusion and exclusion criteria were developed considering the *fittingness* of qualitative research. The inclusion criteria for nurses were as follows: (1) provided direct nursing care to inpatients, (2) had more than one year of clinical experience as of the interview date, and (3) worked continuously without leave of absence for more than six months as of the interview date. The exclusion criteria were as follows: (1) had less than one year of clinical experience as of the interview date, (2) were nursing managers who did not provide direct nursing care, and (3) were outpatient and operating room nurses with different nursing delivery systems.

2.3. Data Collection Method and Procedure. We collected data from three university hospitals, each located in one of Korea's major cities: Seoul, Incheon, and Suwon. The selected hospitals had over 1,000 beds, a ratio of beds to nurses ranging from 2.0 to 2.5. Participants were recruited through a research recruitment notice that included the research team's information as well as the purpose, background, and methods of the study. Informed consent was obtained. When dealing with sensitive topics such as workplace violence, group participants should share similar backgrounds and experiences to create a safe and comfortable environment for them to disclose their personal experiences [34]. To construct the focus group, the research team discussed the criteria related to participants' heterogeneity and decided that these should include clinical seniority. To date, knowledge of the clinical nurses' workplace violence experience and bystander behaviors differ from unit characteristics and clinical seniority. [35, 36]. Drawing from existing literature, the research team structured each focus group to comprise members from similar departments but with diverse levels of clinical seniority. To ensure the *fittingness* of the qualitative research, participants were allocated to the focus groups based on the similarity of hospitals and departments, as well as the diversity of their clinical careers. In total, nine groups were formed, each consisting of three participants. No new information emerged after the ninth focus group interview, indicating that saturation was achieved. The data were collected between July and August 2021.

In the focus group interview, one facilitator (the first author, RN, PhD, female) and one assistant (the second author, RN, PhD, male, or the third author, RN, MSN student, female) attended the discussions with the participants. The facilitator was a nursing researcher who had 15.6 years of experience as a hospital nurse with theoretical sensitivity for understanding workplace violence and the

bystander phenomena in the clinical field. The assistants were two nursing researchers with experience in qualitative research. Prior to the interviews, neither the facilitator nor the assistants had any relationship with any of the participants. The participants could get information about the research team through the recruitment notice.

The focus group interviews were conducted outside each hospital in a private, secure setting with a round table, chairs, and refreshments. Each interview was audio-recorded and lasted between 51 and 62 minutes. In total, the nine sessions amounted to 425 minutes.

The focus group research guidelines outlined by Morgan [33] were followed. First, the operational rules and guidelines for the focus group interviews were established. Initially, the facilitator introduced the research team and the reasons for their interest in this topic. Field notes were taken during the interviews by the assistants. Second, the facilitator participated in all discussions, listened to the contents, and asked the research participants additional questions when necessary. Third, to ensure *credibility*, the facilitator and the research assistants reviewed the recordings and took debriefing notes immediately after the focus group interview. If required, the research team reconfirmed the content of the statements. Repeated interviews were carried out for two participants via phone separately. Recordings were immediately transcribed, and the transcripts were validated through member checks. The transcripts were returned to two participants for comments to ensure their reliability and integrity. Fourth, after the focus group interview, the transcripts were analyzed considering words, context, frequency, intensity, and pattern of repeated statements.

2.4. Focus Group Interview Questions. The focus group interview questions were developed through a literature review. As outlined by Paull et al. [18], a bystander is an individual who takes action in violent situations. Furthermore, the behaviors exhibited by other bystanders can serve as triggers or inhibitors for the actions of another bystander [18, 22]. Consequently, the main research questions were structured to inquire about the diverse bystander behaviors observed by the participants, contextual situations surrounding these behaviors, and resulting outcomes and consequences.

The focus group interviews began with introductory questions about the experience as bystanders of workplace violence, after informing participants of the concept of bystanders of workplace violence. The interviews began with low-level structured questions, and then, a funnel strategy was used. The interview questions are presented in Table 1. At the end of the interview, the facilitator summarized the contents of the discussion and confirmed the meaning and intention of the statements.

2.5. Data Analysis. The collected data were analyzed using inductive and qualitative content analysis methods. Qualitative content analysis allowed for a systematic approach to analyzing the qualitative data collected [37]. It operated within the interpretative framework of the hermeneutic paradigm [38], acknowledging multiple subjective realities

TABLE 1: Focus group interview questions.

Category	Questions
Introductory questions	“Have you ever experienced or witnessed violence at work?”
	“When there is violence at work, how do you and your colleagues react?”
	“What was your experience of your coworker’s behavior in a violent situation at work?”
Main questions	“Please tell us your experience of various bystander behavior at workplace violence.”
	“Under what circumstances do you or your colleagues exhibit bystander behavior?”
	“How do you and your peers experience changes in behavior as a result of bystander behavior?”
Closing questions	“Do you have any more comments to share on workplace violence and bystander conduct?”
	“The following is a summary of the interviews conducted so far. Do you agree with us? Or is there anything else that requires clarification or correction?”

and emphasizing the mutual construction of data, which led to the development of individual and multifaceted perceptions of the phenomenon [39, 40]. Through the qualitative content analysis, complex and rich data from research phenomenon were analyzed moving, beyond descriptive categories to uncover underlying meanings inherent in these categories, thereby identifying latent and interpretative content and formulating themes and subthemes [38, 41]. The inductive content analysis method proved suitable for exploring phenomena that may lack comprehensive prior explanations or knowledge [42]. It involved deriving insights directly from the collected raw data [43], thereby enabling researchers to extract direct information without imposing preconceived theoretical perspectives [42]. In every step of data analysis, all authors (including the facilitator and interview assistant) read the transcripts repeatedly, coded the data independently, and reached a consensus through discussions.

2.6. Preparation Phase. The preparatory stage began by selecting units of analysis to categorize the stated content, such as words, phrases, and sentences [39]. With decontextualization and recontextualization, this nonlinear analysis provided an opportunity to organize codes based on similarities and differences in the data, thus facilitating the transition to the next stage where data are separated from the context [41]. This approach allowed for the illumination of all participants’ experiences of the phenomenon [41]. During the condensing and coding phase, decontextualization was carried out [37]. Each researcher repeatedly read the transcribed data and obtained a sense of the whole content. Then, we set the criteria for selecting the analysis unit through discussion. Two experienced authors independently classified the analysis units: Researcher 1 (the first author) extracted 191 analysis units and Researcher 2 (the second author) extracted 161 analysis units. After two rounds of discussion, 185 analysis units were extracted.

2.7. Organization Phase. The organization step comprised open coding (e.g., indexing), categorization, and abstraction of the extracted analysis units [39]. The abstracting process encompassed all types of collected data, including attitudes

and perceptions [37]. Reorganization and recontextualization were carried out during the organization phase [37, 39]. During recontextualization, separated utterances were merged into a new pattern along with their contextual information, which contributed to the abstracting [44]. During the organization phase, a hierarchical structure was established by grounding into categories and subcategories at the various levels of abstraction [38]. To conduct this process, Researchers 1 and 2 independently coded the qualitative data using the extracted 185 analysis units. Open-code data were categorized into several groups using a comparative analysis and a consensus process. The abstraction and naming of each category were discussed several times, and three categories and six subcategories were derived. As an abstraction, a description of the generated categories and naming using content characteristic words was formulated. Based on the categories established during this process, Researcher 1 outlined the types and characteristics of hospital nurses’ bystander behaviors in workplace violence.

All phases of data analysis were iterative and cyclical. The data analysis process was consensus-based in which all three researchers participated. The process and data analysis results were reviewed by a nursing professor, a doctoral hospital nurse with 32 years of clinical and rich qualitative research experience, and two research participants.

2.8. Trustworthiness (Rigor). Based on the criteria outlined by Lincoln and Guba [40], all interviews were recorded and transcribed; vague or inaccurate transcript contents were reconfirmed with the research participants; two study participants validated them by phone. For *fittingness*, the participants were nurses working in a general tertiary hospital with various departments, work characteristics, and careers. A sufficient number of interviews were conducted until the data reached saturation. The final results were reviewed by two participants. The data collection process was recorded and stored to ensure auditability and confirmability. In addition, the research team consisted of experts in qualitative research methodology. Two qualitative research experts (a nursing professor with qualitative research experience and a clinical nurse with 32 years of experience and a doctorate) reviewed the validity of the results.

Subsequently, the results of the final analysis were summarized.

2.9. Ethical Considerations. This study was conducted in accordance with the ethical standards of the Helsinki Declaration after obtaining ethical approval from the Institutional Review Board of Inha University (Inha University Hospital Institutional Review Board No. 2021-03-009).

3. Results and Discussion

3.1. Study Participants. A total of 26 nurses (including two from the research team) participated in the focus group interview, excluding one who had contracted COVID-19. Participants' ($n = 26$) average age was 26.04 ± 1.31 years. The majority were women ($n = 24$, 92.3%). Their average length of clinical experience as nurses was 39.08 ± 11.03 months. All were registered nurses and staff nurses working in general units ($n = 16$), intensive care units, or emergency rooms ($n = 10$) (Table 2).

3.2. Contents Analysis. In the preparation stage of data analysis, the research teams transcribed and read the data repeatedly and understood the overall meaning. Based on this, the research team set the criteria for the codes of analysis according to participants' responses to workplace violence. During the analysis process, the research team agreed that the participants' bystander behavior was influenced by how they perceived workplace violence and the difference in clinical career between the perpetrator, victim, and themselves (bystanders). Additionally, bystander behavior was found to influence workplace violence in departments.

Based on this, 185 analysis units were extracted according to the analysis criteria and classified into three major themes (reinforcing, avoiding, and suppressing) and six subcategories (facilitative reinforcer, diffuse reinforcer, condoning avoider, powerless avoider, empathic suppressor, and interventional suppressor) (Table 3) (Figure 1). Focus group interviews and data analysis were conducted in Korea to ensure data quality. The participant quotes illustrating the findings were translated into English by the second author, a bilingual nursing researcher with extensive clinical experience in the U.S.

3.3. Reinforcer. Participants indicated that bystanders could play a role in reinforcing bullying behavior in clinical settings. Two types of reinforcers were identified: facilitative and diffuse.

This type of behavior was generally observed in nurses with a higher level of experience than the victim and with a higher or equal level of experience than the perpetrator. Therefore, nurses with less experience were more likely to be negatively affected by workplace violence.

3.3.1. Facilitative Reinforcer. The participants suggested that there is a type of bystander who does not instigate but joins

in an act of bullying in the clinical setting. Facilitators adversely affect victims by actively involving themselves in bullying behaviors and are likely to have the same or even higher organizational authority as perpetrators. A facilitator is more likely to collaborate with or defend a bully when they are closely related to the bully.

"It really frustrates me, you know, say I am being bullied by a senior staff member, then some friends of the bully see us and walk over to us, and say things like "do not go easy on her. She has got to learn her lesson."

(Participant 2, Group 1)

"It pisses me off when other people [the bully's friends] chime in or laugh with [the bully] when I am being bullied; it is like I am having multiple bullies at the same time."

(Participant 1, Group 3)

"Sometimes they [bystanders] say, "Why do you make this so hard for my friend?" while laughing with the bully. . . Then, I now fear not just the bully but the whole group that the bully hangs out with."

(Participant 2, Group 6).

3.3.2. Diffuse Reinforcer. Participants suggested that bystanders reinforce bullying by telling other members of an organization about what happened between the perpetrator and the victim. Bystanders of this type reinforce bullying by gossiping in a way that makes the bullying incident look like something that is part of everyday clinical life. Consequently, an organizational climate may be established that perceives workplace aggression as a normative behavior.

"When a bullying incident occurs, there are always people who like spreading the news to others. . . especially during handoffs at a change of shift. . . they talk about it as though it is not that big of a deal."

(Participant 1, Group 7)

"I really do not want to join their gossip. . . but it is practically hard for me to say flat out, "I do not want to engage in gossip" to a group of seniors and rain on their parade . . . so, I would just find an excuse to stay out of it."

(Participant 1, Group 9).

3.4. Avoiders. Participants described bystanders as those who avoided taking action when a bullying event occurred. Two types of avoidant bystanders were identified: condoners and powerless.

This type of bystander behavior was described by nurses with all levels of experience. They mentioned that this type of bystander behavior is observed among nurses who have

TABLE 2: Demographic characteristics of participants ($n = 26$).

Characteristics	Modalities	n (%) or Mean \pm SD
Age (years)		26.04 \pm 1.31
	≤ 25	10 (38.5)
	26~30	16 (61.5)
Gender	Women	24 (92.3)
	Men	2 (7.7)
Marital status	Unmarried	25 (3.8)
	Married	1 (96.2)
Education	Bachelor's	24 (92.3)
	Master's and above	2 (7.7)
Hospital size (beds)	$\geq 2,000$	8 (30.7)
	1,000–2,000	6 (23.1)
	$\leq 1,000$	12 (45.2)
Length of clinical experience (months)		39.08 \pm 11.03
	13–36	10 (38.5)
	37–60	16 (61.5)
Job position	Staff nurse	26 (100.0)
Unit type	General ward	16 (61.5)
	ICU/ER	10 (38.5)

ICU = intensive care unit; ER = emergency room; SD = standard deviation.

TABLE 3: Types of bystander response behavior against workplace violence.

Categories	Subcategories	Description
Reinforcer	Facilitative reinforcer	Involves themselves in the act of bullying; believes that tense and violent situations are natural and necessary in clinical setting to keep nurses alert A facilitative reinforcer deliberately contributes to the perpetuation or exacerbation of bullying behavior. Their behaviors exacerbate the harmful climate that the bully has cultivated, and thus, enhance workplace violence
	Diffuse reinforcer	Spreads gossip about the bullying incident; believes that tense and violent situations are natural and necessary in clinical setting to keep nurses alert A diffuse reinforcer supports the violent climate by bringing up the witnessed workplace violence incident to other nurses causing them to feel that bullying is normal in the clinical field. Their behaviors exacerbate the harmful climate and, thus, enhance workplace violence
Avoider	Condoning avoider	Takes no action to step into or resolve the situation; believes that tense and violent situations are natural and necessary in clinical setting to keep nurses alert Condoning bystanders may downplay the severity of the situation or deny that workplace violence occurs
	Powerless avoider	Their behaviors exacerbate the harmful climate and enhance workplace violence Takes no action toward bullying despite their belief that violent behavior is wrong and detrimental to the organization. However, powerless bystanders do not intervene in the act or support the victim because of fear of retaliation or lack of experience or empowerment. As a result, their behaviors exacerbate the harmful climate and enhance workplace violence
Suppressor	Empathic suppressor	Checks in with victims and provides emotional support after an incident; believes that violent behavior is wrong and detrimental to the organization. An empathic suppressor may listen to victims and assist them in getting the required help. Thus, they reduce the negative consequences of workplace violence These types of bystanders indirectly provide perpetrators with a signal that workplace violence is unacceptable, which in turn can deter workplace violence
	Interventional suppressor	Uses words or actions to directly intervene in the bullying situation or distract the bully; believes that violent behavior is wrong and detrimental to the organization An interventional suppressor may physically intervene to stop perpetrators, alert authorities, or assist the victim. These types of bystanders directly provide perpetrators with a signal that workplace violence is unacceptable, which in turn can deter workplace violence

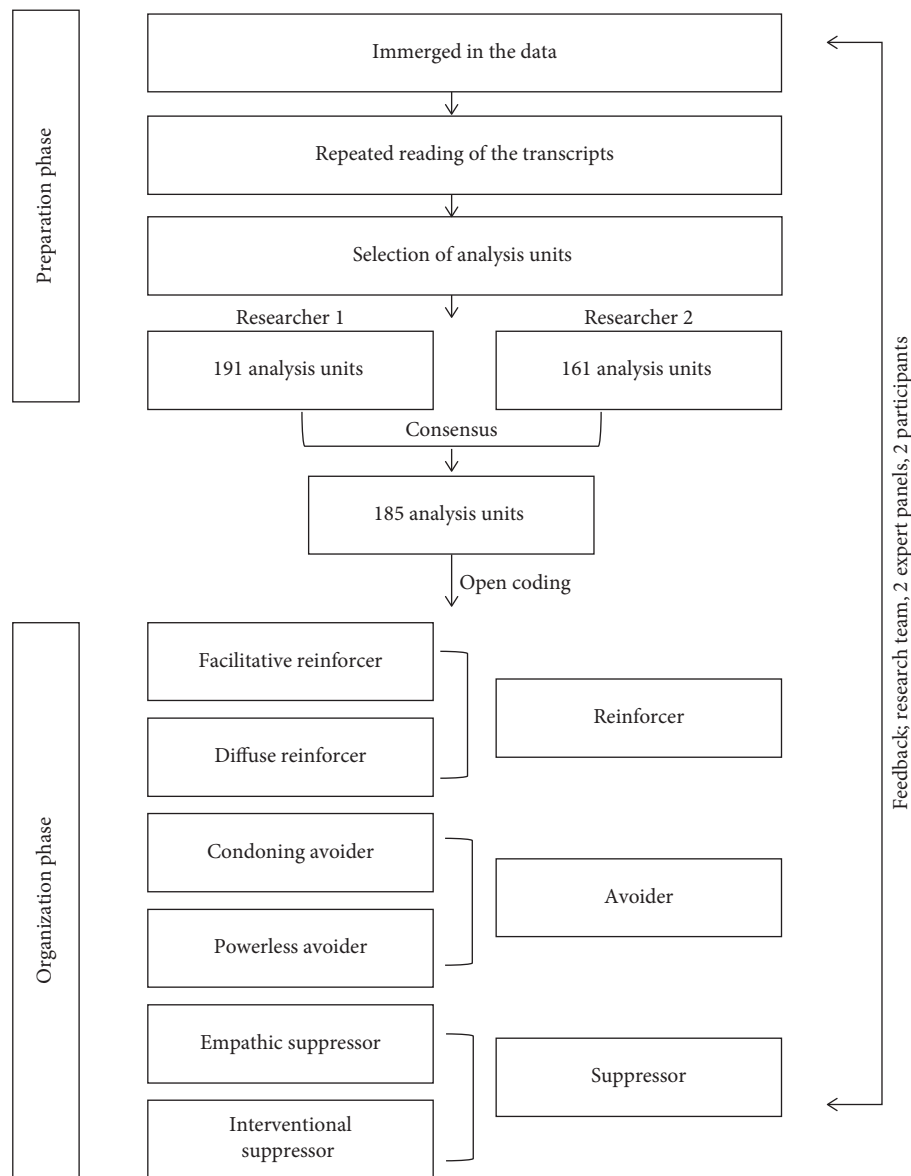


FIGURE 1: Data analysis flowchart.

already accepted workplace violence as part of their daily lives. Acceptance is considered an inevitable form of job training, especially for nurses early in their career. This kind of behavior was also demonstrated when individuals opposed workplace violence but felt powerless to take action because they believed nothing would change.

3.4.1. Condoning Avoider. Condoning avoiders seemed to believe that bullying was an inevitable part of training. They consider bullying to be some kind of a rite of passage or initiation for new nurses. They go so far as to believe acts of bullying are acceptable when they occur between junior and senior staff, assuming that juniors should learn their lessons the hard way.

“Well, I think it [bullying targeted at junior nurses] is inevitable in clinical settings. . . some mistreatment may

be necessary on the job. . . if you are a new nurse and want to be a good one. . . you might need abusive tricks from seniors.”

(Participant 2, Group 3)

“I do not want to see that [bullying behavior by others] . . . I would just leave the scene [without intervening] . . . She [the perpetrator] might have a good reason to be hard on her [victim] . . . and maybe she [victim] deserves it.”

(Participant 3, Group 4).

3.4.2. Powerless Avoider. Participants identified a type of bystander who did not condone bullying but refused to take action because of fear of becoming a target. They would try to leave the scene of the incident or turn a blind eye toward

it. These bystanders, who were often junior nursing staff members, expressed great dissent and distress regarding the workplace violence. As illustrated in the following extracts, the power difference between the bystander and perpetrator is an important factor that renders the bystander powerless to intervene.

“She [the perpetrator] is senior to me; what do you think I can do about it [bullying]? Nothing! Absolutely nothing. I cannot really step in when it is a senior [harassing a junior]. I walked away and returned.”

(Participant 1, Group 2)

“I have never seen anyone stop [in the situation] or come forward, but what can I do when I have little experience?”

(Participant 2, Group 8)

“Sometimes I feel like I am being scolded, and I hate it so much. There is nothing I can do. This is because no one came out.”

(Participant 1, Group 8).

3.5. Suppressor. The suppressor category reflects bystanders who support victims. They intervene in bullying incidents. Nevertheless, they are always wary of bullying in the workplace and do whatever they can. Two subcategories are emerged as follows: empathic and interventional suppressors.

These intervention measures are typically only available to nurses with extensive experience. The recommended intervention methods include engaging in a situation between the perpetrator and the victim, stopping the situation, or redirecting the perpetrator’s focus. However, in the case of nurses with less experience than the perpetrator, this behavior was described as an expression of sympathy and support for the victim rather than a direct action against the perpetrator.

3.5.1. Empathic Suppressor. Participants indicated that bystanders talked to victims privately after the bullying incident and offered them emotional support. These bystanders allowed the victims to know that they were aware of the ongoing bullying incidents in the unit and that they cared about the victims’ feelings. However, they did not take any action to help victims when the bullying occurred. Empathic suppressors were at lower career levels than bullies in the order of seniority based on length of employment.

“When I see one of the new nurses being reprimanded by senior staff, I try to look away. It is hard for me to intervene in such a situation. . . but at the end of a shift I try to find her [the victim] and cheer her up . . . like patting her on the back and saying things like “You are doing great! - I had to go through this too when I was a new nurse.”

(Participant 1, Group 4).

3.5.2. Interventional Suppressor. Participants referred to bystanders who stepped in to stop the bullying act. These bystanders understood the destructive consequences of bullying for the organization. They seem to believe that bullying incidents in a clinical unit increase the stress level of not just the junior staff but also that of the workplace in general. Upon recognizing a bullying incident, they immediately step in and find out what happened by listening to the story from multiple sources, both perpetrators and victims, separately. Most interveners are perceived as being in a position of power in the organizational hierarchy.

“There are instances in which I happen to be the most senior nursing staff member on a shift. If I saw someone bullying another day, I tried to intervene. Previously, I did not care. Now I just tell her “Take it easy!” or call her by her full name like “Ms. so-and-so.” This usually does the trick.” (Participant 2, Group 9)

4. Discussion

This study explored types of bystanders of workplace violence between hospital nurses through qualitative research using focus group interviews. Hospital nurses’ bystander behaviors in nurse-to-nurse workplace violence were classified into three types based on their actions: reinforcer, avoider, and suppressor.

The reinforcing bystanders who intensify workplace violence are categorized into facilitating and diffuse reinforcers. Facilitating reinforcers aggravate the negative consequences of workplace violence by sympathizing with perpetrators’ violent acts and diffuse bystanders make workplace violence commonplace by spreading rumors about it throughout the organization. In this study, nurses in high-power positions within the group displayed reinforcing bystander-type behaviors. Similar to other types of social violence, workplace violence is triggered by a power imbalance among group members [26]. Power imbalance in the clinical field arises from differences in seniority, actual position, and clinical career experience [26, 45]. In these circumstances, it is easy to inflict workplace violence through job training or advising nurses who are new or in a lower career position [46]. In this study, many participants reported that they were exposed to or had observed workplace violence between nurses during job training as novices or advanced beginners. This type of job training has long been recognized as a socialization process unique to nursing organizations, in which workplace violence is recognized as a daily ritual by all perpetrators, victims, and bystanders and has become a social norm [26]. Social norms are the stated or implied rules or standards of conduct that apply to collective behavior [45]. The participants of this study described the reinforcing bystander behaviors as “that kind of thing has always happened.” Workplace violence between perpetrators and victims is “intentional and target-oriented” [26, 46]; reinforcing bystanders do not target

specific people in everyday life. As a nonspecific act, their behavior can be seen as a long-adopted norm of the collective nurse workgroup rather than an act of intentional violence to deliberately suppress the victim. However, the act of strengthening the harm as a reinforcing bystander is accepted as violence by victims and other witnesses, especially by nurses in lower career positions. Hutchinson et al. [47] suggested that organizational tolerance for workplace violence is an important factor influencing bullying behaviors. By allowing the development of a pattern of repeated violent behavior, organizational tolerance and acceptance of workplace violence lead to a new form of intensified aggression. According to Paull et al. [18], aggressive bystander acts increase group tolerance for violence and, hence, reinforce the social norm of accepting workplace violence. This reinforcement worsens the power imbalance within the organization and makes witnesses more fearful of becoming the next victim, exacerbating violence in the group.

The second bystander type identified in this study is the avoider type, who may condone the violence or feel powerless and avoid the situation. Condoning bystander behaviors were observed in members of all levels of clinical careers within the group. "Doing nothing" is the most frequently reported behavior among witnesses of various social violence [14, 48]. This is also observed in nursing organizations, and inaction has been reported as the most common behavior of nurses when witnessing workplace violence [14, 16]. Báez-León et al. [16] highlighted that, when most nurses witness workplace violence, they choose not to engage in it or to remain silent. This was expressed as ignoring, taking no action, or doing nothing [30]. The reasons for being a condoning bystander are different from those for other forms of social violence. Hoxmeier et al. [48] found that the most common reasons for avoiding violent situations among college students were "none of my business" or "unsure of the situation." However, one reason for condoning bystander behavior in the nursing context is the perception of workplace violence as a natural phenomenon in nursing groups. In particular, the participants reported that they did not get involved "because I learned how to do the job that way," and sometimes, they avoided violent situations "to let it happen." In particular, this was reported prominently in workplace violence during the job training of nurses in lower career positions. Participants who experienced or chose the condoning bystander behavior said that those in a lower career position needed to learn the nursing job "with a certain level of tension." Therefore, rather than recognizing workplace violence as a problematic situation, it was recognized as a natural or necessary situation. However, powerless bystanders of workplace violence were different from those who condoned violence. They admitted that workplace violence was prevalent but did not accept that it was natural or justified. Instead, they believed that it could not be prevented or felt helpless to stop it and avoided it. Learned helplessness contributes to neglect of workplace violence in nursing organizations [14, 16]. Another cause of powerless bystander behavior identified in this study was fear of retaliation. Fear of reprisal has been reported in

previous studies as the reason for inaction against workplace violence in nursing organizations [16, 49]. The absence of reprisal fear was a critical influential factor in nurses' intention to help victims of workplace violence [16]. In a previous study, the reasons for reluctance to act against workplace violence were reported as fear of negative influence on oneself (39.7%) and cases in which the perpetrator was too powerful (35.5%) [49]. Fear of reprisal grew stronger when the perpetrator retaliated [24, 50]. Consequently, witnessing violence in the workplace acts as another form of violence for powerless bystanders, and they share the ripple effect of the harm caused by violence [51]. Avoiding bystander behaviors strengthens organizational tolerance for violence in the group by making the victim, as well as witnesses, perceive violence as a natural organizational characteristic [16, 52], resulting in the isolation of victims and the strengthening of violence in organizations [10, 18].

The third type of bystander identified in this study was the suppressor, which was divided into empathic and interventional suppressors. Nurses who understood that workplace violence was an unnecessary immoral practice and an unjust behavior that adversely affected both nurses and patients exhibited this type of behavior. They were classified as groups that expressed sympathy for the victims' situation and groups that chose actions to support them. Empathic suppressors paid attention to workplace violence but were characterized by supporting the victim after the situation was over rather than stopping the incident. As a result, the negative consequences of workplace violence experienced by victims were mitigated; however, the influence of workplace violence prevention was weak. Empathic suppressors were nurses with lower power than perpetrators. They expressed that if the perpetrator had a longer clinical career, they could not stop the perpetrator. In contrast, an interventional suppressor directly engaged in workplace violence and interrupted or stopped the situation to protect the victim and restrain the perpetrator. Interventional suppressors had a higher career status than perpetrators. Suppressor bystanders positively influence workplace violence and its consequences for nursing organizations. Positive bystander behavior had a more significant influence on nursing outcomes than workplace violence did. According to previous studies, when there was a positive perception of bystanders, nursing care quality was better [10] and there were fewer handover errors [53]. Suppressor bystanders not only mitigate the negative consequences of workplace violence by protecting the victim but they also dampen the power imbalance between the perpetrator and the victim by creating group pressure on the perpetrator to stop such incidents [10, 18]. By informing group members that workplace violence is not acceptable, suppressor bystanders can influence organizational norms that tolerate workplace violence [10, 18, 52]. Consequently, the frequency and intensity of workplace violence can be reduced and prevented [18, 22, 25]. Considering that nurses in a higher career position can form supportive subjective norms and reduce fear of reprisal, suppressor bystanders are crucial. Báez-León et al. [16] reported that the right action of a witness can be an important motivator for others.

MacCurtain et al. [49] also emphasized the influence of positive bystanders, stating that positive bystander behaviors of nurses in higher career status with important positions in the department can reflex socially constructed norms. In this regard, organizational strategies to strengthen positive bystanders can be an effective approach to prevent workplace violence [14, 54, 55].

This study has several limitations. First, it employed focus group interviews rather than in-depth individual interviews as the source of qualitative data. This was done because the research team intended to bring out the participants' various experiences regarding workplace violence, including interactions within the interview group. There might have been limitations in deriving the in-depth experience of each individual during this process. Therefore, in future research, the three types of bystander behavioral experiences presented in this study need to be explored more deeply. Second, a limitation of the current study arises due to the research context of the COVID-19 pandemic. The qualitative data were collected in 2021, during the pandemic period. The research team kept in mind that the workplace environmental changes caused by the COVID-19 pandemic could present another bias in the exploration of workplace violence phenomenon. To minimize the potential influence of COVID-19, the research team strived to keep the discussion within the general and comprehensive range of workplace violence and bystander behavior. Additionally, all interviews were conducted on topics unrelated to COVID-19, focusing on the phenomenon itself. Another major change faced by the research team due to the COVID-19 pandemic was the size of the focus group, which included only three participants, owing to the COVID-19-related restrictions. Considering this limitation, we encouraged the participants to interact with each other sufficiently during the interview and were able to reach saturation by involving a sufficient number of groups. Third, the current research participants were recruited from the big tertiary hospitals in the metropolitan cities of South Korea, so the external validity could be limited, and the results should be generalized with caution. To address this limitation and consider the fittingness of the qualitative research, the research team tried to strike a balance between participants' homogeneity and heterogeneity. For the heterogeneity of the participants, clinical seniority was considered an individual difference, and for the homogeneity, the hospital and department were considered to have contextual similarities. Fourth, this study did not utilize a theoretical framework as the basis for constructing its research methodologies. Therefore, further research should employ a useful theoretical framework to explain workplace violence among nurses and its consequences. For example, affective events theory, which posits that workplace events trigger affective reactions that in turn influence employees' attitudes and behaviors [56], could be considered. Fifth, workplace violence experienced by nurses can be categorized as patient-nurse, doctor-nurse, and nurse-nurse. This study explored bystanders' involvement in workplace violence by focusing on violence between nurses. As confirmed in this study, the type of behavior of bystanders in workplace violence is influenced by the individual's perception of the violence (accepted social norms, etc.) and power imbalance between perpetrators, victims, and bystanders. Thus,

nurses' bystander behavior in patient-nurse and doctor-nurse violence may differ from the results of this study. Based on these results, future studies can develop a measurement tool that can measure bystander types in the workplace in a nursing context. A quantitative study is recommended to empirically describe the influence of a positive bystander on the perpetrator, victim, and other bystanders.

5. Conclusions

This study explored specific types of bystanders unique to the nursing context. Three different types of bystanders were identified and categorized by the perceptions of workplace violence as accepted natural norms and power differences in clinical careers between perpetrators, victims, and bystanders. In addition, each type of bystander had a different influence on perpetrators, victims, and other bystanders, thereby aggravating or suppressing workplace violence. This suggests that a strategy can be proposed to overcome the limitations of existing workplace violence prevention policies which focus only on violence between perpetrators and victims and to prevent workplace violence more fundamentally, targeting multiple bystanders. Therefore, nursing organizations must more actively establish strategies that utilize the concept of positive bystanders to prevent violence in the workplace. Specifically, nursing organizations should educate nurses about the concept of bystanders so that the nurses understand that, even if they are not a perpetrator or victim of workplace violence, as bystanders, they are still involved. Additionally, nursing organizations and leaders should empower nurses to play a positive bystander role.

Data Availability

The interview data supporting the findings of this study are available from the corresponding author upon request, for researchers who meet the criteria for accessing confidential data.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Research Article

Exploring Factors Affecting the Rollout of a Policy on Registered Advanced Nurse Practitioners in Ireland

Naomi Elliott ¹, **Louise Daly**,² **Denise Bryant-Lukosius**,³ **Sandra Fleming**,⁴ **Jarlath Varley**,^{1,5} **Patrick Cotter**,⁶ **Elaine Lehane**,⁶ **Shauna Rogerson**,⁷ **David O'Reilly**,⁸ **Jonathan Drennan**,⁹ and **Anne-Marie Brady**¹⁰

¹School of Nursing and Midwifery, Trinity College Dublin, The University of Dublin, 24 D'Olier Street, Dublin 2, Ireland

²Ageing and Community Nursing Trinity, Centre for Practice and Healthcare Innovation, School of Nursing & Midwifery, Trinity College Dublin, The University of Dublin, 24 D'Olier Street, Dublin 2, Ireland

³School of Nursing, McMaster University, Health Science Centre 2J25, 1280 Main Street West, Hamilton Ontario L8S 4K1, Canada

⁴School of Nursing and Midwifery, Trinity College Dublin, The University of Dublin, 24 D'Olier Street, Dublin 2, Ireland

⁵RCSI School of Nursing and Midwifery, 123 St Stephen's Green, Dublin D02 YN77, Ireland

⁶Catherine McAuley School of Nursing and Midwifery, Brookfield Health Sciences Complex, University College Cork, Cork T12 AK54, Ireland

⁷University College Cork, School of Nursing and Midwifery, Brookfield Health Sciences Complex, College Road Cork T12 AK54, Cork, Ireland

⁸Faculty of Biological Sciences, School of Biomedical Sciences, University of Leeds, Leeds, UK

⁹School of Nursing, Midwifery and Health Systems, University College Dublin, Belfield, Dublin 4, Ireland

¹⁰Trinity Centre for Practice and Healthcare Innovation, School of Nursing and Midwifery, Trinity College Dublin, The University of Dublin, 24 D'Olier Street, Dublin 2, Ireland

Correspondence should be addressed to Naomi Elliott; naomi.elliott@tcd.ie

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Aim. To identify the barriers and enablers to the implementation of a national policy to increase and develop the advanced nurse practitioner (ANP) workforce in Ireland. **Background.** The Department of Health (Ireland) introduced a policy to increase the number of ANPs to 2% of the nursing workforce. Evaluation provides information to inform successful policy implementation and development of ANP roles in healthcare services. **Methods.** Qualitative descriptive design. Twenty candidate ANPs participated in four focus groups. Nine key stakeholders were also interviewed. **Results.** Analysis identified four barriers: lack of infrastructural resources; delay in releasing and arranging replacements for candidate ANPs; role resistance from administration, allied healthcare professionals and other nurses; and lack of organisational readiness. The five enablers were: supportive physicians; Nursing and Midwifery Practice Development Units; supportive directors of nursing; role awareness and clarity; and educational preparation. **Conclusions.** This evaluation identifies barriers and enablers to the implementation of a national policy to increase the critical mass of advanced practitioners within the healthcare services. Evaluation at the implementation phase informed the roll-out of future advanced practice initiatives. **Implications for Nursing Management.** To support advanced practice development, leadership, infrastructure, and resource planning are needed to harness known enablers and address identified barriers to the implementation and sustainability of these posts.

1. Introduction

Recent decades have witnessed the growth of Advanced Nurse Practitioner (ANPs) roles. Globally, such roles evidence diversity in the rationale for their development, role focus and functions, role titling and terminology, education and regulation requirements [1], International Council of Nurses (ICN) 2020; [2]. This is noted in the most recent ICN [3] guidelines which aim to provide uniformity in the identification and integration of such roles within systems of healthcare. Evidence of the positive impact of the ANP role include beneficial patient outcomes, continuity and integration of care, clinical leadership and, improved efficiency and cost effectiveness [3–7]. However, to be successful, the introduction of, and succession planning relating to, ANP roles should be linked to identified service needs and involve comprehensive planning along with education and strategic and organisational supports, and evaluation [8, 9]. An increasing empirical focus on the factors that can support the implementation and development of the ANP role is evident. This paper reports on the qualitative findings from an evaluation of the introduction of a policy to increase the number of ANPs in key patient areas [10]. Specifically, the research identified barriers and enablers to the development of the role from the perspective of candidate ANPs (cANP), registered ANPs and key stakeholders.

2. Background and Context

In the Republic of Ireland, the registered ANP role was first accredited in 2002 and is defined as a “career pathway for registered nurses, committed to continuing professional development and clinical supervision, to practice at a higher level of capability as independent, autonomous, and expert practitioners” Nursing and Midwifery Board of Ireland (NMBI). Registered ANPs have competencies that enable them to be senior decision makers, work collaboratively, demonstrate clinical leadership and research skills, undertake advanced physical and/or mental health assessments, and implement evidence-based interventions including prescribing when needed with service users that have complex and multiple needs [11]. Those holding the role are regulated and subject to the Advanced Practice (Nursing) Standards and Requirements published by the NMBI [12] for education and registration of ANPs. To meet the increasing demands within the health service and acknowledging the impact that ANPs were having on patient care, the Department of Health published the document *Developing a Policy for Graduate Specialist and Advanced Nursing & Midwifery Practice: Consultation Paper* [13]. This consultation paper outlined a new structured model for graduate to advanced practice to support the development of a critical mass of nurses and midwives to “address emerging and future service needs and drive integration between services” (p.8). This document identified a goal of increasing the number of ANPs to 2% ($n=700$ approximately) of the nursing and midwifery workforce by 2021 and led to the roll-out of a two-year demonstrator project (the subject of this evaluation). This was followed by the publication of *A Policy*

on the Development of Graduate to Advanced Nursing and Midwifery Practice in 2019 (Department of Health). In Ireland, those nurses preparing to be ANPs are titled “candidate ANPs”; this refers to a nurse who is undertaking an advanced nursing practice Master’s degree education programme which includes both academic and advanced clinical competency requirements. Candidate ANPs are employees within the health services and to undertake the education programme, need protected study leave and to be released from clinical practice.

Evidence suggests that considerations pertinent to the support of ANP roles are both complex and multiple. A scoping review by Whitehead et al. [14] focusing on factors that provide a positive impact identified the importance of a robust candidacy programme, clarity of roles which are identified to address a clear gap in the provision of healthcare, interdisciplinary integration, strong mentorship and ongoing professional development. In Australia, a national system for regulating the credentialing of Nurse Practitioners which sets the standards for assessment and competency requirements is identified as an important factor in supporting advanced practitioner role development [15]. Similarly, Lee et al. [16] comparative analysis of nursing regulatory frameworks between Mexico and the United Kingdom highlights the importance of having regulatory frameworks to ensure a coherent and uniformly understood approach, thereby optimising the development of advanced practice nursing that meets health care needs. Findings of a study of role satisfaction, highlighted that empowerment-related factors were also critical, including collegiality, professional growth and research [17]. Other studies have identified the importance of organisational readiness and policies, governance and future planning in relation to succession and regulation [1, 9, 18, 19]. An understanding of such factors is pivotal to the success of the ANP role and the redress of healthcare needs if sustainable change is to be achieved [14, 20]. Therefore, evaluation of innovations to grow ANP roles and related experiences are imperative to understand factors that enable the development, implementation and sustainability of the role within local contexts. This paper reports on the findings from one part of a multicomponent evaluation study [10] that examined the impact of the national consultation document and the development of a policy to develop ANPs in four key areas: older person’s care, unscheduled care, and respiratory and rheumatology [13]. The aim of the component reported herein was to explore ANPs’ and other stakeholders’ perspectives on the implementation of the policy. The aim was achieved by applying a qualitative descriptive methodology.

3. Methods

3.1. Design, Setting and Participants. A qualitative descriptive approach was used as it enables the exploration of research participants’ perspectives on issues of importance aligned to research questions [21]. The main evaluation study design [10] was informed by the Participatory Evidence-Informed Patient-Centred Process for Advanced Practice Nursing Role Development (PEPPA) and PEPPA-

Plus frameworks which were designed to inform the development, implementation, and evaluation of ANP roles [8, 22]. The PEPPA framework emphasizes strategies to mitigate frequently reported barriers to effective ANP role design and implementation, while PEPPA-Plus provides enhanced guidance for role evaluation. The PEPPA framework has been used in over 25 countries to introduce a variety of advanced nursing and other healthcare provider roles with reported benefits of framework related to role clarity, stakeholder role acceptance and support, and successful role implementation [23]. A freely accessible online toolkit [24] provides detailed guidance on how to implement the stepwise, systematic framework. The frameworks incorporate Donabedian's [25] theory and provide conceptual clarity by distinguishing the structure-process-outcome aspects of the ANP role development that have important considerations within the evaluation process. Importantly, the frameworks provide clarity by distinguishing between short-term, intermediate-term and long-term outcomes of the ANP role which inform the goal and direction of the evaluation.

At policy level, PEPPA provides an evaluation framework that can be used at the three stages of role development namely, (1) introduction, (2) implementation and (3) sustainability. Use of the framework was therefore appropriate to the aim of the overall study, while providing a baseline dataset against which future evaluations can be used to compare progress on factors that influence key outcomes such as waiting list reduction, timely access to services and avoidance of unnecessary hospital admissions.

3.2. Data Collection. In the qualitative component, semi-structured focus group and individual in-depth interviews were conducted to gather data pertinent to experiences of the implementation process, factors impacting upon it and outcomes. Participants were recruited via purposive and snowball sampling methods. Interview guides were developed by the research team from the study aim and objectives, and previous literature on ANPs (see Table 1). The use of interview guides provided for consistency across interviews.

Participants from each of the four key areas (older person's care, unscheduled care, respiratory, and rheumatology) were sought via local gatekeepers. Area managers within Nursing Practice Development where candidate ANPs were recruited, acted as gatekeepers. The sampling strategy used was designed to provide for a national spread, geographical and clinical area diversity and the concept of information power was used to determine data sufficiency [26]. Candidate ANPs were employed in acute healthcare settings, out-patient services, and a number were developing links with community care services. Focus groups were held with each of the four areas in which ANPs were recruited as consequence of policy implementation: older person's care ($n=5$), respiratory ($n=5$), rheumatology ($n=6$) and unscheduled care ($n=4$). The four focus groups were each facilitated by two research team members and were held face-to-face. Individual face-to-face or telephone interviews ($n=9$) were held with other key stakeholders. The key

stakeholders provided perspectives of those with first-hand experience of the ANP policy implementation at individual ANP, local and national levels including clinician candidate ANP supervisors, medical consultants, allied healthcare professionals, and senior nursing managers in local and national settings.

3.3. Data Analysis. Template analysis was employed to explore the data with reference to the study aim. This form of thematic analysis focuses on research conducted within real-world contexts and facilitates the definition and organisation of themes [27, 28]. It is located midway on the inductive-deductive continuum. The approach enables structure and flexibility in how data can be analysed. Template analysis is operationalised via seven steps that were applied as outlined in Table 2 by two of the research team with extensive experience in qualitative research. NVivo 12 Plus [30] software was employed to facilitate the analytical interrogation and management of data.

3.4. Ethical Considerations. Ethical permission to conduct the study was obtained from a university ethics committee and relevant local research ethics committees. Participants were provided with Participant Information Leaflets, with explicit and process approaches to informed consent applied, along with the principles of voluntariness and confidentiality in relation to study participation, data processing and study write-up.

3.5. Findings. Data analysis identified the key barriers and enablers to the implementation of the ANP draft policy as listed in Table 3.

3.6. Barriers to ANP Draft Policy Implementation. The analysis identified four key barriers to the implementation of the policy: lack of infrastructure resources; delay in releasing and arranging staffing replacement for candidate ANPs; role resistance from administration, allied healthcare professionals and other nurses; and lack of organisational readiness.

Candidate ANPs and key stakeholders identified a lack of infrastructure resources such as clinic space, administrative support, office space and a specific ANP administrative identifier code as major barriers to the candidate ANP's ability to develop ANP-led clinics and manage patient caseloads. The lack of clinic space, which is essential for clinical assessments and patient treatments, and administrative support for ANP-led clinics to schedule patient appointments, manage check-in services, patient charts or type referral/letters which were available to medical teams, was perceived as limiting the candidate ANP's ability to effectively fulfil their role.

Organizationally, the resources and the space for people has been a really sticky one for some of the candidates not being able to [have] protected space for assessment and management of patients. (Key Stakeholder 4)

TABLE 1: Semi-structured interview question guide.

Q1	What motivated you to pursue this cANP/ANP role?
Q2	Can you explain how you were recruited?
Q3	Tell us about what is different about your cANP/ANP role in the context of this service?
Q4	Have you experienced any challenges in your new role? What strategies did you use to overcome those challenges?
Q5	What organisational factors enabled you in your role to date?
Q6	What are the arrangements for supervision, support and mentorship with your new role?
Q7	Can you comment on the specific contribution of your role to your specialty area?
Q8	What do you see as the specific contribution since the cANP/ANP role was implemented to: patients/families; the multidisciplinary team; the health service organisation?
Q9	Can you describe the impact of your cANP/ANP role on health service needs?
Q10	If the policy was to be expanded what one thing would you recommend to enhance the process?

TABLE 2: Template analysis [28].

Template analysis step	Application in the current study
1. Data familiarisation and identification Identification of <i>a priori</i> themes	Two of the research team listened to, read and re-read the interview transcripts to facilitate early engagement with and reflection on the interview and focus group data The taxonomy of implementation outcomes [29] and advanced nursing practice literature informed the identification of soft <i>a priori</i> themes (potentially relevant aspects of the data)
2. Preliminary coding	Recurring concepts in the data relating to the research purpose (within and between transcripts) were identified, discussed and operationally defined in NVivo. Codes from the tentative <i>a priori</i> themes were tested against the data
3. Clustering	Developing themes were organised into meaningful clusters. Researchers explored how themes might relate to each other
4. Production of the initial template	As clustering advanced, researchers reached consensus on the initial template
5. Developing the initial template	Openness was maintained to facilitate ongoing refinement of the template
6. Applying the template	Organisation of hierarchical themes advanced in tandem with revisiting the interview transcripts to ensure thorough application of the template
7. Write up	The analytical interpretation was written up, discussed with reference to the study aim and objectives by the overall research team and finalised

TABLE 3: Key Barriers and Enablers to ANP draft policy implementation.

Key barriers	Key enablers
(i) Lack of infrastructure resources; (ii) Delay in releasing and arranging staffing replacement for candidate ANPs; (iii) Role resistance from administration, allied healthcare professionals and other nurses; (iv) Lack of organisational readiness	(i) Supportive physicians; (ii) Nursing and midwifery practice development unit (NMPDU); (iii) Supportive directors of nursing; (iv) Role awareness and role clarity; (v) ANP preparation educational programme

Delays in release and staffing replacement arrangements for candidate ANPs to undertake their education programme and engage in role development were also identified as hindering the process of ANP policy implementation. Because the launch of the policy was rapid, many replacement arrangements were not in place and candidate ANPs frequently found themselves needing to continue working in their previous clinical nurse specialist (CNS) or staff nurse role whilst at the same time, undertake the ANP education programme and start-up new ANP-led patient services. These delays not only created role confusion with physicians, nursing colleagues and patients, but also reduced the time available for candidate ANPs to set-up new clinical

services. At local level, delays with staffing replacement arrangements were linked to the need to fill the vacant CNS posts and overall challenges with succession management.

It took almost a year for us to actually start [the candidacy] in the knowledge and experience appropriate for the ANP role. (ANP Focus Group 1)

At local level, some candidate ANPs reported having experienced role resistance from other grades such as administration, allied healthcare professionals and other nurses. In healthcare organisations with little or no previous experience of ANPs, participants reported that administrative

services were frequently not available to support ANP-led clinics; this was reported to result in a reduction in the number of patients treated by ANPs. Where there was role resistance from nursing colleagues, resistance in recognising the ANP's extended role including authority for patient treatments was also reported. In some cases, allied healthcare professionals were identified as reluctant to accept patient referrals from ANPs, requests for laboratory tests, X-ray ordering or medication prescriptions.

Radiology was a huge area... ordering a chest X-ray... I would have been probably the first one to go through in my hospital. I'm almost two years into the job and literally got it this month, approval to order x-rays. (ANP Focus Group 2)

Due to the accelerated start-up of new candidate ANP roles, organisational readiness was reduced, and many did not have the optimal lead in time to establish governance structures to support role implementation. This also impacted on an organisation's readiness to manage problems that could arise, for example, with clinical supervision or delays in candidate ANP's progression to registration. Whilst formal service-level agreements between the director of nursing, candidate ANP and clinical supervisor were a pre-requisite in the application process for new ANP posts, the overall governance structures were, in places, under-developed at the time of the new policy implementation. Participants reported that having clear governance structures are important to provide clear pathways of communication to help resolve problems. This was also identified as important to provide clarity within the local organisation about the candidate ANP's extended scope of practice such as ordering x-rays and computerised tomography scans, prescribing medication and making patient referrals to other healthcare professionals.

I don't think the hospital was prepared for the policy... we came in on the basis of the policy, but the hospital wasn't prepared for that and hadn't the mechanisms for the structure set up to support it. (ANP Focus Group 4)

3.7. Enablers to ANP Policy Implementation. The analysis identified five key enablers to the implementation of the policy: supportive physicians; the Nursing and Midwifery Practice Development Unit (NMPDU); supportive directors of nursing; role awareness and clarity; and the ANP preparation educational programme.

Physicians, who acted as a clinical supervisor and mentor for candidate ANPs, were identified as one of the factors that were essential to the successful implementation of the policy. Physicians provided support throughout role development and integration by identifying new service needs, negotiating with senior management for resources for candidate ANPs, encouraging other physicians to support ANP initiatives and organising clinical rotations for the education programme. At an individual level, physicians also provided personal encouragement and support. Physicians who participated in

the interview and had trained in other countries with established advanced nursing practice, had a clear understanding of what the ANP role involved, how it could benefit patient services and were active champions of the new cANP roles locally.

The NMPDU and the Unit's project officers were also identified as instrumental to successful policy implementation. These units are part of the Health Services Executive working under the Office of the Nursing and Midwifery Services Director and have a remit to provide strategic development of the nursing and midwifery workforce through workforce planning initiatives and building leadership capacity within nursing and midwifery in Ireland. They supported the candidate ANPs as they transitioned from the role as clinical nurse specialist (CNS)/staff nurse to Registered ANP by guiding them through the application process, clinical portfolio requirements, how to navigate local settings and set agendas for meetings with senior management. At an organisational level, the NMPDU provided a range of supports including templates for job descriptions, memoranda of understanding for clinical supervision so that directors of nursing and candidate ANPs had clarity regarding the role and could use these standard templates to save time from having to design new documents. The NMPDU also supported the development of national standards for competencies required at ANP level which provide role clarity for all stakeholders including physicians supervising candidate ANPs and directors of nursing for signing-off candidate ANPs as being ready for registration.

We have nationally an advanced practice network within the Office of Nursing and Midwifery Service Directorate... When the policy was launched, and the demonstrator site project was launched, we would have supported directors of nursing in their business cases for applications for candidates. (Key Stakeholder 5)

Directors of nursing who facilitated the new ANP roles were also identified as important enablers to the successful implementation of the ANP policy. In hospitals where directors actively supported the new roles, they did so by managing the prompt release of candidates to undertake the programme, facilitating candidate ANPs to navigate barriers, maintaining interest in their progress and providing clear leadership in multi-disciplinary meetings to ensure the effective integration of new ANPs into the healthcare organisation.

Support from their organizations is essential and that's why you need your directors of nursing tuned in very much into what the role is and they [ANPs] need to be part of the senior nursing team. (Key Stakeholder 2)

Role awareness and clarity on how the ANP role differed from other nursing roles was important to the successful integration of new candidate ANPs into the organisation. In organisations with established ANP posts, role awareness at senior nursing management and physician levels was clear

and barriers for new candidate ANPs were reduced. For candidate ANPs working in organisations with little or no experience of the role, they actively worked at raising awareness about their role and managing expectations through various strategies including developing referral pathways to differentiate ANP and CNS roles, presenting at interdisciplinary meetings and conferences and developing job descriptions with consultant involvement.

The education programme, which was set by the national standards and requirements for the ANP [12], was also identified as a key enabler. It was perceived by participants as providing clarity on the academic and clinical requirements of the role, and the competencies for advanced clinical skills and caseload management.

The training was fantastic. I just love what it's opened up.
(ANP Focus Group 4)

4. Discussion

Based on the PEPPA and PEPPA-Plus frameworks [8, 23], this study [10] was carried out at the implementation phase of the new policy to increase the number of ANPs in the health service in Ireland [31]. This paper examined the barriers and enablers to policy implementation identified from the evaluation to better understand the factors influencing the development and integration of new ANP roles into the health services. As in the 2022 report of the Expert Review Body on Nursing and Midwifery [32], the Minister for Health recommended a further increase in the numbers of ANPs, from 2% to a revised target of 3% of the nursing workforce. This highlights the importance and relevance of findings of the evaluation study to support the further development of the ANP role in Ireland. The evaluation findings provide evidence which could inform future roll-out of such policy programmes in Ireland and may also have implications for similar programmes internationally.

A key feature of the ANP policy in Ireland [31], was the role of national organisations, in particular NMPDUs in leading the process of policy implementation. Although ANPs had been employed in Ireland since 2002, for several years the posts were limited. Following the publication of the policy and the increase in posts, this resulted in many of these new ANP roles being introduced into local healthcare organisations not accustomed to starting-up such posts and to clinical areas with few or no existing ANPs to provide mentoring to the candidate ANPs. Thus, the NMPDU guidelines and templates, including ANP job descriptions, provided organisational-level support to directors of nursing who had to set up these new roles rapidly in their organisations and avoid time delays with having to develop job descriptions from scratch. The NMPDU guidelines and templates also provided for consistency across the introduction of the new ANP roles across different clinical areas and multiple healthcare organisations. At candidate ANP-level, the Project Officers within the NMPDU were key in providing mentorship and supporting candidate ANPs as they transitioned from roles as clinical nurse specialists/staff nurses to that of ANP roles involving patient caseload

management, and clinical and professional leadership. Within the international literature on advanced practice, support from mentors or preceptors is recognised as a key factor influencing the successful development and integration of these roles [14].

The role of physicians who provided clinical supervision and mentoring was a key factor enabling policy implementation. However, as the numbers of ANPs increase it is expected that ANPs themselves will become clinical supervisors for future candidate ANPs. Recognising the need for having a coherent approach to clinical supervision, Lee et al. [33] highlight the importance of having national standards for supervision session structures and documentation tools thereby ensuring consistency across different healthcare organisations and universities. Clinical supervision is one factor that may ultimately affect the long-term sustainability of ANP role development and future policy implementation. The barriers to sustainability and progression of advanced nurse practitioners are complex and multi-factorial and include lack of funding and lack of medical, nursing, and organisational support [34]. The issue of clinical supervision and ensuring quality clinical supervision needs to be central in the design and delivery of ANP education programmes to ensure the sustainability of these roles.

With the introduction of new ANPs, major governance and process changes were required so that they could fulfil their extended scope of practice that included prescribing medications, ordering diagnostic tests and X-Rays, and making patient referrals to other healthcare professionals. This impacted on other healthcare professions and structures such as the Local Implementation Groups (LIGs) which were established to provide a multidisciplinary forum where issues could be discussed with the key stakeholders and problems clarified, explored, and resolved with locally mediated solutions. Similarly, Smith et al. [35] in a study of rural nurse practitioners in Australia, identified local health service managers and community supports as important enablers which can define the parameters of advanced nurse practitioner service delivery. In the Irish context, the LIG had the potential to maximise ANP role clarity and understanding within the local healthcare organisation and minimise the likelihood of role resistance.

Candidate ANPs in this evaluation experienced a number of barriers to their role. This may have been due, partly, to the relatively quick implementation of the policy and time needed by the health service to develop organisational readiness. There is growing evidence of the importance of organisational support and change management processes facilitated by leadership to the successful integration of advanced practitioners [14, 36–38]. Similarly, in this study, senior management were identified as having a key role in fostering organisational support and dealing with issues such as lack of recognition or role resistance which can have a negative impact on ability of ANPs to fulfil their role and workload expectations.

The policy initiative to increase the number of ANPs has the potential to greatly enhance healthcare service delivery in Ireland in the long-term. However, for the implementation

of such initiatives to be successful, this will require continued support at national, local and individual levels [35, 37]. In Ireland, this initiative has benefitted from having a clear national policy and regulatory systems, targeted clinical areas, and funding for the new ANP roles in place at the outset. It also benefitted from having the necessary numbers of interested and eligible candidates who were motivated to advance their clinical careers. Although this evaluation study was carried out in the early implementation stage, some candidate ANPs were beginning to express concerns arising from the need for enhanced organisational supports, which, if not in place, could negatively impact on the long-term sustainability of the national policy programme to increase the number of ANPs in the nursing workforce. Whilst the factors influencing job satisfaction are complex, a national survey of advanced nurse practitioners in Taiwan found that organisational commitment was ranked as the most important work-related variable linked to job satisfaction [39]. Similarly, Wood et al. [40] study of the experiences of UK nurse practitioners, links support for advanced practitioners with levels of satisfaction with the role. Creating an organisational culture that is open to the integration of new ANP roles is an ongoing process that will take time. It is recognised that this evaluation was carried out in the early stages of a rapid policy implementation, however, it is also recognised that the long-term sustainability of the policy to develop a critical mass of ANPs to address emerging and future health service needs is at risk unless ANPs are supported adequately by senior management and the healthcare organisation.

5. Conclusion

This evaluation presents findings on the key barriers and enablers to the implementation of a policy to increase the number of ANPs in Ireland. Implementation of national policy initiatives within healthcare organisations is challenging and complex. Policymakers, healthcare funders and organisations need to evaluate such initiatives so that lessons learnt can inform and improve the future development and integration of ANPs within the healthcare system. The knowledge generated contains transformative potential in that it can inform the future design and support of such roles so that they meet evolving healthcare needs and enable ANPs to function independently within their scope of practice.

Data Availability

The qualitative data used to support the findings of this study are included within the article.

Additional Points

Implications for Nursing Management. To support advanced nurse practitioner development, leadership, infrastructure and resource planning are needed to harness known enablers and address identified barriers to the implementation and sustenance of related posts. Lessons learnt from evaluation at

the implementation phase of new policies can inform the future roll-out and long-term sustainability of developments to build advanced nurse practitioner capacity and realise the potential of nurse practitioners in delivery of healthcare.

Ethical Approval

Ethical approval for this study as granted by the Research Ethics Committees of University College Cork and relevant local research ethics committees.

Conflicts of Interest

Authors declare that there are no conflicts of interest.

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Research Article

Exploring Psychosocial Needs of Patients with Cancers through the Lens of the Physicians and Nurses: A Qualitative Study

A. Fernández-Feito ^{1,2}, C. Alonso-Iglesias ³, M. Paz-Zulueta ^{4,5}
and A. Pellico-López ^{4,5,6}

¹Área de Enfermería, Facultad de Medicina y Ciencias de la Salud, Universidad de Oviedo, Avda. Julián Clavería s/n, Oviedo 33006, Spain

²Instituto de Investigación Sanitaria del Principado de Asturias (ISPA), Grupo de Investigación en Cuidados, Av. del Hospital Universitario, 33011 Oviedo, Spain

³Facultad de Medicina y Ciencias de la Salud, Universidad de Oviedo, Avda. Julián Clavería s/n, 33006 Oviedo, Spain

⁴Departamento de Enfermería, Universidad de Cantabria, Avda Valdecilla s/n. C.P, 39008 Santander, Spain

⁵Instituto de Investigación Sanitaria Valdecilla (IDIVAL), Grupo de Investigación en Derecho Sanitario y Bioética (GRIDES), C/Cardenal Herrera Oria s/n, 39011 Cantabria, Spain

⁶Servicio de Salud de Cantabria, Avda. Derechos de la Infancia 31, 39340 Cantabria, Spain

Correspondence should be addressed to M. Paz-Zulueta; maria.paz@unican.es

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Aims. To explore the experience of nurses and physicians regarding psychosocial needs of patients with cancer and to describe their perception according to professional category and clinical setting. **Design.** A qualitative descriptive study. **Method.** 14 nurses and 12 physicians were selected from three hospital clinical units and four primary care centers in northern Spain. Data were collected using semistructured interviews. Content analysis was performed using open coding. Reporting of findings followed the COREQ checklist. **Results.** Four themes were identified: the needs of patients with cancer, psychosocial care provided by health professionals, difficulties addressing psychosocial needs, and available resources. According to nurses and physicians, being diagnosed with cancer involves a radical life-changing process, with a profound impact at the psychosocial level. Within the field of psychosocial care, the role perceived by each profession was different. Thus, nurses highlighted the need for these patients to receive emotional support and care, although limited importance is given to psychosocial needs. The role of physicians was more focused on referring these patients to other health professionals. The lack of training or time was one of the main difficulties perceived by the professionals. The family is a fundamental resource and, overall, patients are provided with limited information about other psychosocial resources. At the hospital, the emphasis is placed on physical needs and health professionals experience greater burnout and fear of compassion fatigue. Primary care teams could, therefore, have a primary role in addressing psychosocial needs due to their understanding of each person's context and personal circumstances. **Conclusions.** It is essential for nurses and physicians to consider the psychosocial needs of patients with cancer. However, these needs are not always adequately addressed. Further resources are required to reduce the workload, increase the training of health professionals, and introduce organizational changes to consider psychosocial needs during routine care.

1. Introduction

The importance of integrating psychosocial care within the routine care of patients with cancer has been increasingly recognized [1], especially as numerous unmet psychosocial

needs (PNs) have been identified [2], which can have a negative impact on their quality of life [2, 3].

Previous studies have shown that unmet PNs affect oncology patients with different pathologies such as hematological tumors [4], gynecological cancer [5], or

colorectal cancer [3, 6]. These PN are related to information needs [2, 3, 7], fear of recurrence [3], support needs [5, 7], or psychological issues in general [2]. However, it is also known that patients do not always express their unmet PNs, sometimes for fear of stigmatization or because of difficulties encountered in the physician-patient-relationship [8]. And as expressed by oncology nurses, this can be a problem especially in older cancer patients where the needs may go unnoticed [9].

In psychosocial care, health professionals play a fundamental role. Specifically, nurses play an important role in identifying and meeting unmet psychosocial needs in different contexts, such as clinical units before and after surgery, oncology units, and/or primary care, considered an essential element in the provision of psychosocial care [9]. However, for oncology nurses working in an emotionally charged environment and with time constraints, despite recognizing the importance of PNs, their priority was physical needs, as providing psychosocial care is often a secondary concern, based on the limited time available [10].

Furthermore, this role may be perceived as a challenge, in relation to the particularities of cancer and patient characteristics, because of the lack of support from the team or the institution. Thus, a former study found that providing psychosocial care was an overall satisfying process for nurses, allowing them to grow as individuals, despite coming at a high cost in terms of fatigue and emotional exhaustion [11]. Moreover, there is limited evidence on the role of nurses in addressing PNs in cancer patients in surgical units or in primary care teams [12].

Regarding physicians' response to PNs, according to the perspective of primary care physicians, they identified that their role should be to coordinate patient care, manage comorbidities, and provide information and psychosocial support to patients and their families. However, the role of these primary care professionals is not always close to this ideal, mainly due to communication problems that derive in a lack of updated reports or a lack of clarity regarding their role [13]. These findings are generally consistent with another study on the barriers encountered by primary care physicians caring for cancer patients, which included limited knowledge, lack of time or financial incentives, or less patient trust [14].

Some of the proposals to improve the ability to address these PNs, with considerable consensus among patients and healthcare professionals, would be to change certain behaviors to improve the support provided by the clinical staff and the availability of resources [8]. It would also be advisable to routinely ask patients about their needs and expectations, especially in some patients who may have difficulties in identifying and expressing their demands, e.g., due to advanced age [9].

In terms of training needs, it has been proposed that all primary care providers should be trained to care for the growing number of cancer patients, maintaining good communication and working together with oncologists. These training needs refer to both initial training and continued education throughout their careers, in order to research and implement evidence-based guidelines and assess quality of life in cancer survivors [15].

Therefore, it is still necessary to investigate the involvement of the different health professionals in the approach to PNs, considering the importance of implementing psychosocial assessments in routine care [16]. It is important to incorporate their point of view, since most studies have been carried out from the perspective of patients and/or family members [2, 7] and the perception of health professionals such as cancer surgeons or medical residents is unknown, whose experience has been less explored. In addition, it is becoming increasingly important to address psychosocial demands through multidisciplinary teams [17] considering the main settings (hospital and primary care) where these patients with cancer receive care for years.

The aims of this study were to explore the experience of nurses and physicians regarding psychosocial needs in patients with cancer and to describe their perception according to professional category (nurses/physicians) and clinical setting (hospital/primary care).

2. Methods

2.1. Design. A descriptive qualitative study was conducted. The rationale for this type of research is based on the interest in collecting the subjective and close-up views of health professionals caring for cancer patients in the real clinical setting. The aim is to obtain a straight description of the phenomena, trying to understand their experience in their context in order to carry out an analysis and interpretation of the findings while staying close to the data [18, 19].

2.2. Participants and Settings. This study included nurses and physicians from three clinical units (oncology, general surgery, and otorhinolaryngology surgery) of the Hospital Universitario Central de Asturias (level 3 hospital with about 1000 beds) and from four primary care centers in two urban health districts in Asturias (Northern Spain). The inclusion criteria were being a nurse, physician, or resident physician, being active (i.e., not being on medical leave), and with a minimum of two years of clinical professional experience caring for cancer patients in the hospital or in primary care (not exclusively oncology units). The exclusion criteria were a personal history of cancer, with academic qualifications other than nursing or medicine (psychology and social work), and working in the oncology day hospital (chemotherapy administration center) or the radiotherapy services. Professionals with a heterogeneous profile in terms of sex, age, and professional experience were included in the study applying the following segmentation criteria: profession (nurse/physician) and clinical setting (hospital/primary care).

Purposive sampling was used to select healthcare professionals, either through the research team's contacts or through the involvement of gatekeepers such as the supervisor of the hospital oncology unit. In addition, snowball sampling was used, where participants proposed new health professionals that were relevant to the study. Finally, 26 health professionals (14 nurses and 12 physicians) participated in the study. None of the people contacted refused to participate in the study. Each health professional was

contacted by telephone at their workplace, to explain the study purpose and methodology, together with the voluntary and confidential nature of their participation. The respondents did not receive any compensation for their participation and were informed of the independent nature of this research in relation to their workplace.

2.3. Individual Interviews. Data collection took place via individual semistructured interviews. An interview script was designed, which was previously agreed upon by the work team, mainly addressing the needs of cancer patients, the psychosocial assessment of these patients, and proposals for improving psychosocial care (Table 1).

First, a pilot interview was conducted with the nursing supervisor of the oncology unit of the Hospital Universitario Central de Asturias. The research team who conducted the interviews consisted of a female nursing student who based her final degree project on this study, a social worker (female) with experience in health social work, and a university professor (female) with experience in nursing care research and qualitative methodology. Only the university professor was previously acquainted with some of the participants for work and teaching-related reasons. Both an interviewer and an observer were present during the interviews.

The interviews took place between January and March 2020 in the professionals' workplaces before starting or at the end of their working day, according to the participants' wishes, all of which were audio-recorded. All participants were informed of the study objective and the characteristics of the interviewers (profession and institutions involved in the study). A data collection sheet was used for each professional (sex, age, professional profile, unit, and work center) together with a field diary. The diary was used to compile the characteristics of the meeting (place, duration, consent, voice recording) and a summary of the interview content, as well as other relevant aspects of nonverbal communication, specific cases during their professional experience, etc. The duration of each interview ranged between 10 and 30 minutes. The criterion for terminating the interviews was saturation of the discourse. No interviews had to be repeated.

Each participant was offered the possibility of listening to the recording or reading the interview transcript. Only one nurse requested to review her interview, which was sent to her by e-mail; however, she made no changes to the content.

2.4. Data Analysis. The analysis was carried out in three main phases: preparation of the data, organization of results, and reporting, according to Elo and Kyngäs [20]. In the preparation phase, each complete interview was established as the unit of analysis, establishing that only the manifest content from the verbatim transcription of the interviews would be analyzed, without considering nonverbal language (silences, posture, etc.). Next, an inductive content analysis was conducted, where themes emerged from the data through open coding. Two independent analysts selected two interviews from two participants with a different profile (nurse in a surgical unit and a palliative physician in primary

care) to establish the coding paradigm. To familiarize themselves with the material, each interview was read several times. The intersubjectivity of the team was carried out through the interactive work of the researchers, enriching the analytical capacity and providing a deeper understanding, as opposed to studies where a lone researcher performs the analysis. The contributions of each researcher were valued by the rest of the researchers during the team discussions, with an open mind that subsequently stimulated reflection. The coding system was agreed upon by both researchers, calling on the third researcher in the case of discrepancies. Subsequently, a different analyst completed the coding of all interviews. The codes were grouped into categories that emerged freely in this phase. These categories were then grouped into a higher hierarchical system, organized into themes. When several categories referred to a similar content, they were collapsed. Each category was named using content-characteristic words. Themes were refined in successive rounds of the analysis after gaining a better understanding of the meaning of the nurses' and physicians' experience of PNs. Regarding the last phase, the results were shown in a table, presenting the classification system of the data in codes, subthemes, and topics. The most representative, authentic citations were included in the Results section along with the main themes and subthemes. This helped to increase the trustworthiness of the research, by pointing out to readers what kind of original data lead to the formulated categories. The results were sent to three nurses as a feedback measure with the participants. Throughout the process, the researchers maintained a reflective attitude, being aware of how their thoughts and experiences fed into the analysis, which, in turn, led to changes in themselves as a result of the research process [21]. Nonetheless, they were able to maintain the necessary distance as researchers to see beyond the participants' narratives, as well as contradictions and problems related to their contributions [21].

The rigor of the research is fundamentally based on the clear sample rationale and the triangulation of researchers during the data analysis [22].

For the processing and organization of the data, we used MAXQDA software. The study findings were reported according to the consolidated criteria for reporting qualitative research (COREQ) [23].

2.5. Ethical Considerations. Favorable permission was obtained from the Clinical Research Ethics Committee of Principado of Asturias (REF 314/19) and the Directorate of Nursing of the health district. All participants signed the informed consent form. The study complied with local regulations for the approval of observational studies in Europe and according to the Helsinki Declaration.

3. Results

3.1. Participant Characteristics. The characteristics of the 26 participants are described in Table 2. The distribution by sex was balanced, with 53.8% women. The mean age was

TABLE 1: Semistructured interview guide.

The needs of patients with cancer	<p>(1) In your experience with people with cancer, what kind of needs do you think they have?</p> <p>(2) When caring for cancer patients, what importance is given to psychosocial needs? How do you think this area is currently being assessed? What difficulties do you perceive in making this assessment?</p> <p>(3) Which professionals would be responsible for evaluating these psychosocial needs, at what level of care should this assessment be carried out (referring to specialized hospital care/primary care), have you made referrals to a psychologist/psychiatrist and/or social worker?</p> <p>(4) What training have you received on these topics?</p>
Proposals for improving psychosocial care	<p>(5) What is your opinion of the information given to these patients about resources or support services (psychology, social work)?</p> <p>(6) How do you think the detection of psychosocial needs in people with cancer can be improved?</p>

48.1 years, ranging from 26 to 61 years. In total, 14 nurses and 12 physicians were included. Over half of the professionals (61.5%) worked at the hospital, distributed among three services: two surgical (surgery and otorhinolaryngology) and one medical service (oncology). The remaining professionals worked in primary care, which also included a physician and a nurse from the palliative home care unit. The mean experience was 22.3 years, ranging from 2 to 43 years. Only six professionals (four nurses and two physicians) had training in addressing psychosocial needs. Sixteen professionals had family members or friends with cancer in their close environment.

3.2. The Experience of Nurses and Physicians regarding Psychosocial Needs in Patients with Cancer. No pre-established coding system was established; therefore, the ideas or concepts emerged directly from the data through an inductive analysis. The information was segmented and grouped into four levels of coding (subcodes, codes, subthemes, and themes). Four themes were identified: the needs of patients with cancer, the psychosocial care provided by health professionals, the difficulties in addressing psychosocial needs, and the resources available.

Table 3 describes the needs of patients with cancer according to nurses and physicians. Within this theme, 24 codes and six subthemes were identified. The professionals recounted that these patients need psychological or emotional support throughout the process, although some reject it at first because they feel strong and believe they do not need it. Virtually, all patients have important emotional needs (love, affection, empathy, and feeling supported) because facing cancer reveals their emotional weaknesses. In the process of coming to terms with the diagnosis, taking antidepressants is not always helpful. It is also important to pay attention to how emotions change at different stages after receiving the diagnosis; i.e., emotions change over time, and each patient has a unique emotional response that they may or may not show.

Although they associate having cancer with a loss of functionality and independence, the needs of these patients transcend physical symptoms, and the psychosocial sphere becomes even more of a priority than the physical sphere. They need help to cope with the most frequent symptoms

such as pain or fatigue but also to physically adapt to living with the disease and its chronic sequelae.

They also need to receive information, but it is important to consider each person's wishes about how much they want to receive.

People with cancer want to talk, share, and verbalize their fears, especially regarding facing death or overcoming the social stigma attached to having cancer. These patients demand to be listened to, as they are sometimes unable to vent their feelings to their families and expect healthcare professionals to allow them to express themselves without reservation. They often want to talk about their feelings, about hopelessness in the final stages, about unfulfilled dreams, and about decisions they would like to make, and sharing these thoughts and emotions helps them to cope.

Many professionals likened a cancer diagnosis to a tsunami that forces patients to face uncertainty with difficulty to accept the reality and/or the diagnosis.

“Then they have to adapt their life, reorganize it. There are other people who can't come to terms with this situation, the change that comes first with the diagnosis and then the symptoms, because they need help with basic day-to-day activities, depending on what the disease may cause, and then to adapt their life” (oncologist, hospital).

Finally, these patients require a lot of care that usually starts after the surgical treatment in the hospital and continues at home. Health professionals usually focus on the physical aspects and forget to maintain a holistic view, considering the spiritual needs of the patients, a crucial aspect in a disease of this significance. Some patients feel that health staff show little interest in their religiosity, barely exploring whether they need spiritual help.

Regarding the second theme (Table 4), on the psychosocial care provided by health professionals, two subthemes were identified: the role of each profession (six codes and 18 subcodes) and the reality of their day-to-day work (five codes and 21 subcodes). This theme contains the largest number of codes and subcodes.

Concerning the role of each profession, according to the opinion of nurses and physicians, the assessment of psychosocial needs in these patients can be performed by any

TABLE 2: Characteristics of participants.

Code	Sex	Age	Profession	Clinical setting	Professional experience (years)	Psychosocial training	Family or friends with cancer
E1	Man	52	Registered nurse	Hospital (surgery)	32	No	Yes
E2	Woman	34	Registered nurse	Hospital (surgery)	12	No	Yes
E3	Woman	45	Registered nurse	Hospital (surgery)	20	No	Yes
E4	Woman	40	Registered nurse	Hospital (oncology)	17	Yes	No
E5	Woman	38	Registered nurse	Hospital (oncology)	14	No	Yes
E6	Woman	41	Registered nurse	Hospital (oncology)	20	No	No
E7	Man	44	Registered nurse	Hospital (oncology)	16	No	Yes
E8	Woman	60	Registered nurse	Hospital (oncology. Advance care planning nurse)	40	Yes	Yes
E9	Woman	60	Registered nurse	Primary care	43	No	Yes
E10	Woman	60	Registered nurse	Primary care	35	Yes	Yes
E11	Man	28	Registered nurse	Primary care	5	No	Yes
E12	Man	57	Registered nurse	Primary care	33	No	No
E13	Man	59	Registered nurse	Primary care	34	No	No
E14	Woman	54	Registered nurse	Primary care (palliative care)	30	Yes	No
E15	Woman	51	Physician	Hospital (surgery)	26	Yes	Yes
E16	Man	59	Physician	Hospital (surgery)	35	No	Yes
E17	Woman	29	Physician	Hospital (surgery resident)	5	No	No
E18	Woman	28	Physician	Hospital (otorhinolaryngology)	6	No	Yes
E19	Man	26	Physician	Hospital (otorhinolaryngology resident)	2	No	Yes
E20	Man	61	Physician	Hospital (oncology)	30	No	Yes
E21	Man	43	Physician	Hospital (oncology)	18	No	No
E22	Man	39	Physician	Hospital (oncology)	11	No	Yes
E23	Woman	60	Physician	Primary care	30	No	Yes
E24	Woman	60	Physician	Primary care	37	No	No
E25	Man	64	Physician	Primary care	41	No	No
E26	Man	59	Physician	Primary care (palliative care)	27	Yes	No

TABLE 3: The needs of patients with cancer from the professionals' perspective.

Themes	Subthemes	Codes
The need of patients with cancer	The need for psychological support	<p>They need emotional support</p> <p>They need emotional support throughout the process</p> <p>Initial perception of not needing psychological support</p> <p>They have significant affective needs</p> <p>Loss of functionality</p> <p>General (pain) and specific physical needs (depending on the type of tumor)</p> <p>Needs that transcend the physical sphere</p> <p>The psychosocial sphere is more of a priority than the physical sphere in people with cancer</p>
	Physical needs	<p>They need information</p> <p>Only receiving the information they demand</p> <p>Improving information in the final stages of life</p> <p>There are still patients who are unaware of the diagnosis</p> <p>Facing death</p> <p>Overcoming the social stigma attached to cancer</p> <p>They need to talk, to be listened to</p> <p>We avoid talking about feelings</p> <p>Coping with uncertainty</p> <p>It is hard to accept reality</p> <p>It is hard to come to terms with the diagnosis</p> <p>Each person experiences it in their own way</p> <p>Information on organizational aspects</p> <p>Confusion due to erroneous information</p> <p>Respect for religious or spiritual needs</p> <p>Assimilating changes (ostomies)</p>
The needs of patients with cancer	Need for information	
	Speaking, sharing, and verbalizing fears	
	Cancer as a tsunami	
	The need for care	

TABLE 4: Psychosocial care provided by health professionals.

Themes	Subthemes	Codes	Subcodes						
Psychosocial care provided by health professionals	The role of each profession	The assessment of social needs can be carried out by any professional and the alarm can be raised by anyone who detects it The most suited health professional to identify psychosocial needs We are not addressing the psychosocial sphere well within nursing assessment care plans	Registered nurse	The importance of a good nursing assessment They may refer patients to the social work unit					
				Physician	Primarily refers patients with psychosocial needs to other healthcare providers They have difficulty addressing emotional needs They are focused on therapeutic needs				
					The physician and registered nurse deliver patient care in tandem They would need to have a prior comprehensive assessment				
				Influence of the characteristics of each professional	Psychosocial care depends on the sensitivity or previous experience of the health professional	Psychosocial care is a personal decision of each professional Psychosocial care depends on the empathy of the professional The need for multidisciplinary teams	The importance of having psychologists/psycho-oncologists in the team The psychologist is the most appropriate professional to provide emotional support for patients		
								Expectations on psychology and social work	The psychiatrist is not identified as a psychosocial support figure The social worker as a psychosocial support agent The main role of the social worker is to obtain resources Lack of knowledge of the role of social work
									It is not given enough importance among health professionals It is being adequately assessed
								Addressing the psychosocial sphere during health care	It should explore the individual circumstances of each patient
				Some patients avoid talking about emotions in consultation They often need more support than psychiatric treatment We cover the physical needs					
				Day-to-day reality	How are patients' emotional needs addressed?	The patient with cancer is primarily cared for at hospital Social risk is detected throughout the hospital stay We detect social problems at discharge	It is the ideal setting for detecting and addressing psychosocial needs They have a better understanding of the patient's environment and support network		
								During the hospital stay	They are there for and accompany the patient As a society, we live with our backs turned to illness and death
Primary care approach	The healthcare model should take patients' needs more into account The social situation conditions coping and treatment								
Health care for cancer patients in Spanish society	Primary care approach	It is the ideal setting for detecting and addressing psychosocial needs They have a better understanding of the patient's environment and support network	They are there for and accompany the patient As a society, we live with our backs turned to illness and death						
				Primary care approach	The healthcare model should take patients' needs more into account The social situation conditions coping and treatment				

professional and the alarm should be raised by anyone who detects unmet psychosocial needs, although nurses are the best suited professionals to identify PNs.

“Nursing. I think the nurse is the one who spends the most time with the patient and we are the ones who see those needs.” (Oncology nurse, hospital).

However, nurses themselves were aware of the importance of conducting a good nursing assessment that addresses this psychosocial sphere.

“Well, the social part isn’t covered for me, no, it’s not covered, neither during the admission nor outside, and. . . there are people or patients who are sad or angry, but you don’t want to dig too much into why. So, if you can, it should be mandatory for me to address that. That area should be covered, just as their pain is covered. Because sometimes the pain can be because you don’t manage it well, because of nerves or because of sadness, or even prolonging the stay because they are alone, because they are afraid. So, for me it’s important, and many stays are lengthened because of social and psychological issues.” (Surgical nurse, hospital).

The role of physicians is primarily to refer patients with PNs to the psychologist and/or social worker. In addition, the characteristics of each professional were significant, depending on their sensitivity, previous experience, or empathy. In addition, it is necessary to have multidisciplinary teams, where the role of the psychologist/psychoncologist is key as the professional who can provide the main emotional support, followed by the social worker, although many professionals are unaware of their field of action.

Regarding the day-to-day reality, not enough importance is given to the psychosocial sphere during health care, although some professionals did believe that it is being adequately assessed (especially in primary care). The approach to the psychosocial sphere could be summarized as “No questions asked, no solution provided” or “It is only addressed once the more clinical part has been resolved.”

“What is life-threatening for this gentleman, the fact that he’s sad or that he has colon cancer? Well, the cancer. You leave the other things aside, the sadness or how he copes with the tumor or his particular disease because first we’re going to solve this and then we’ll see.” (Surgeon, hospital).

In terms of the emotional needs of these patients, some professionals acknowledged that patients refuse psychiatric support because of the stigma toward mental health or the perception that they can cope on their own. However, the emotional sphere is generally neglected, and emotional needs are detected late.

During hospitalization, PNs or psychosocial risk is detected progressively, after several days of hospital stay and especially when hospital discharge is approaching. The professionals at the hospital stated that they are focused on

physical needs and during the first years after diagnosis, the patient with cancer requires hospital care (i.e., surgery, treatments such as chemotherapy and radiotherapy, and checkups). Nonetheless, many professionals agreed that primary care would be the ideal setting for detecting and dealing with PNs, since they are more familiar with the patients’ environment and family and social support network (neighbors, people in the community who can help them, volunteers, etc.). It was also noted that the approach to these PNs occurs in a social context where we live with our backs turned to the disease and death, where we should be more aware of the needs of patients and their social situation, as this often conditions their coping and even their treatment.

Concerning the third theme on the difficulties in dealing with PNs (Table 5), aspects related to the institution or the staff were highlighted. Three subthemes were included, with 10 codes and 6 subcodes. The main difficulties were the lack of training (conceived as voluntary and not favored during working hours) and lack of time. The lack of continuity between hospital and primary care or the scarce relevance of these issues in the clinical history was also noted. The professionals also identified problems of communication and interference with the family, as well as the risk of compassion fatigue, recognizing the fear of becoming too involved and the difficulty of providing emotional support.

“Not having a prescription to say: take this for two minutes, take it like this and come back tomorrow. To accompany, to be with the pain, with the doubt, and well, sometimes just to listen, other times you have to listen and. . . offer a solution.” (Physician, primary care).

The available resources related to psychosocial care were grouped into three subthemes and 11 codes (Table 5): information on resources (the patient is not informed about resources because the professionals themselves are unaware of them), the family as a psychosocial resource (the existing family support determines whether the person needs extra support or not), and the role of associations, which are providing psychological help and resources to cope with the major life change in cancer patients.

3.3. Distinctive Features of the Perception of Psychosocial Needs of Patients in Nursing and Medicine. The need to provide emotional support for cancer patients in nursing was one of the major aspects discussed. Thus, patients need to be able to talk and be listened to in order to face uncertainty and to confront death. The need for care was only mentioned by nurses, highlighting the importance of empathy on behalf of nurses and their need for support in certain situations (patients with ostomies). The physicians affirmed that not everyone needs psychological help, although patients find it difficult to accept the diagnosis.

Regarding the role of each profession, nurses reaffirmed that they perceived that they were the appropriate professional figure to detect PNs, especially during admission, whereas the physicians’ role focused on therapeutic needs (surgical intervention, medical treatment,

TABLE 5: The challenges and resources for the psychosocial approach in patients with cancer.

Themes	Subthemes	Codes	Subcodes
Difficulties in addressing psychosocial needs	Institutional/staffing aspects	Lack of training	<ul style="list-style-type: none"> Psychosocial training on a voluntary basis Lack of training during specialized training Training during working hours is not favored We do not have enough time
		Lack of time	<ul style="list-style-type: none"> Assessing psychosocial aspects requires time for the patient to open up/be sincere Dehumanized care
			<ul style="list-style-type: none"> Lack of continuity of hospital/primary care Minimal relevance in the electronic health record Lack of professional sensitivity Excessive workload We should communicate better Interferences with the family
	Communication problems		<ul style="list-style-type: none"> Fear of getting too involved with the patient It is difficult to provide emotional support
	Risk of compassion fatigue		<ul style="list-style-type: none"> The patient is not informed about resources
	Information on resources		<ul style="list-style-type: none"> The professionals themselves are unaware of the resources Some patients are aware of the resources and others are not Consider the family's financial situation
The resources available for psychosocial care	The family as a psychosocial resource	Having family support	<ul style="list-style-type: none"> (or not having it) determines whether or not you need extra support The need to consider the patient/family tandem The difficult role of the family It is the patient's main emotional pillar
	The role of associations		<ul style="list-style-type: none"> They receive psychological/other help from the associations They provide resources to cope with the radical change of life Associations as a resource are not proposed to patients

etc.), explicitly acknowledging their difficulty in addressing emotional needs.

In their day-to-day work, the nurses mostly felt that not enough importance is given to the psychosocial sphere, and therefore, unmet PNs are not attended to, especially at the emotional level, which coincides with the physicians' perception that they do not usually assess the patient's emotional state.

In relation to the difficulties in dealing with PNs, the nurses stated that they lacked the tools to avoid professional burnout, expressing the fear of becoming too involved with patients. They also acknowledged the difficulty of providing emotional support and the lack of professional sensitivity to the psychosocial sphere. Some physicians felt unable to address the patient's psychological experience, recognizing that they lack training going back to the time that they were residents, and acknowledging that they have an excessive workload. Physicians perceived that it would be easier to address this psychosocial sphere in primary care. They were aware of the importance of the psychosocial context and family support because these patients face a long process. Both professionals agreed on the need for training, especially during the workday.

In terms of resources, among the nurses, it was more frequent to refer the patient to social work for information on resources since they themselves were unaware of them. They also affirmed that associations are a support resource for dealing with the radical life change faced by patients, although for many nurses, it is an unknown resource, which they seldom recommend. Some physicians agreed that they could play a more proactive role in offering resources and barely mentioned the role of associations. Nurses acknowledged, to a greater extent, the difficult role of the family when one member has cancer, its value as an essential resource for patients, and the importance of considering a patient/family tandem.

3.4. Distinctive Features of the Perception of Psychosocial Needs of Patients in Hospital vs. Primary Care. The professionals referred that at the hospital, many patients perceive at the onset that they do not need psychological support. Also, there is a sense that not all patients will need it. They are aware that the needs of these patients go beyond the physical sphere; however, according to Western medicine, most of the focus is placed on the physical sphere. Numerous referrals are made from the hospital to other services (especially from medicine to psychology and nursing to social work), and they demand that psychologists/psycho-oncologists should be a part of multidisciplinary teams. Hospital professionals perceived more professional burnout, more fear of compassion fatigue and lack of tools to face this situation. They also recognized the lack of time and excessive workload, which dehumanizes care, although they considered that a regular emotional assessment of patients is important as well as developing the skills to improve communication with patients and families. During hospital visits, professionals are better placed to assess the person's family support, whereas the socioeconomic situation of each family is more well known in primary care.

In contrast, in primary care, professionals emphasized the importance of the medical/nursing tandem, as well as the importance of assessing the circumstances in which patients live, who usually require more support than psychiatric treatment to detect vulnerable situations.

4. Discussion

Our results depict the professionals' perception regarding the PNs of patients with cancer and the role they can assume in responding to that aspect of care. These needs are mainly emotional, because of the impact of the diagnosis and the significance it may have on their future life. It is a tsunami at a personal and family level, where patients want to share their thoughts and emotions because they are afraid of losing their physical independence and are very concerned about uncertainty and death. They also have a need for information about the disease and about resources that they usually receive in associations or through social workers.

Nurses and physicians believe that each professional category has a different role, reflecting on the daily reality where various difficulties arise at the institutional level, together with a lack of time or training. Additionally, the information given to patients about available resources can be improved and the family represents an important resource.

The first category that emerged from the interviews with nurses and physicians was the needs of patients with cancer, who are undergoing a situation of great uncertainty in which they need psychosocial support, especially at the emotional level. According to other authors [2], emotional support is the main psychosocial need found in quantitative studies. Qualitative studies highlight the psychological and spiritual needs of patients related to feelings of fear, hopelessness, uncertainty about the future, sadness, anger, anxiety, frustration, and despair. The main support strategy of the professionals is active listening, empathy, and individual advice on how to cope with their situation. Many patients preferred this type of support to pharmacological treatment, which is what they usually receive [24].

Nurses are more likely to mention the need for patient support, whereas physicians feel that it may not be necessary in all cases [25]. Nurses perceive that patients want to share what they think and feel with them because they cannot always vent to their families and even if nurses or physicians are unable to solve their problems, they find it comforting to be listened to [2].

Professionals and patients coincided in their perception of cancer as a disease with limited chances of survival, which made them both feel vulnerable and in need of new knowledge and skills [14]. The professionals' own emotional vulnerability can make it difficult for them to cope with the requirements of a therapeutic relationship that lasts for years [25]. The importance of spiritual needs should also be recognized, a topic that is complex for nurses to address but critical for patients nearing the end of life. Again, active listening and normalizing conversations about their beliefs and respecting silences are successful communication strategies for providing spiritual care [26].

Concerning the psychosocial care provided by professionals, the respondents highlighted that the main role of nurses was the identification of PNs, whereas physicians oversaw the referral to other professionals, noting the advantage of working in multidisciplinary teams. In our study, physicians and nurses assumed the low importance given to the psychosocial sphere and when comparing their opinion, it was striking how nurses reaffirmed themselves as the main professional to detect PNs [9]. Other studies have also identified how nurses value the need to establish psychosocial care from the moment of diagnosis and accept the importance of their role yet frame it in the context of multidisciplinary teamwork [14]. The privileged role of nurses may be because good communication lays the foundations for a quality clinical relationship with patients and families [10]. In parallel, a systematic and comprehensive nursing assessment favors early detection and management of PNs [27]. It would be interesting to strive for a systematic detection of PNs with standardized and validated tools, such as the distress thermometer in cancer patients [28].

Regarding day-to-day work, in our study, the professionals stated that PNs are generally not assessed, especially during hospital admission where physical needs are prioritized. In particular, the physicians defended primary care as the most favorable environment to consider these needs and to gather information on the patient's environment, whereas primary care physicians and nurses emphasized teamwork between both professionals. The study by Easley et al. [13] found that both hospital and primary care physicians identified family physicians as the ideal professional to coordinate between different specialists, treat comorbidities, and inform and support patients and families. They pointed out the need to improve communication between levels and the training of family physicians. Other studies especially highlighted the role of the primary nurse in the care of patients who have survived cancer and benefit from a comprehensive long-term care model [15]. In general, the professionals appreciated having a figure to coordinate the care to whom both the patient and other care providers could turn to [25]. Also, having this professional as a reference throughout the process could favor the patient's confidence [29]. This longitudinal perspective is an important strength of public health systems with universal coverage and a network of multidisciplinary primary care teams such as that of Spain, in which the family doctor or nurse practitioner can be the professional of reference.

The third category was the difficulties in addressing psychosocial needs, emerging in relation to organization, lack of communication or continuity between levels and workload, or lack of time. In the hospital setting, workload and the lack of tools were of particular concern. In other studies, the lack of training in psychosocial care and communication skills, together with the high burden that prioritizes physical care over psychosocial care, are barriers to the hospital environment [9, 14]. In primary care, professionals identified certain difficulties such as low patient confidence, lack of time, and poor transmission of information from oncology to understand the patient's

follow-up and play a more active role in their care [12]. However, the use of electronic medical records can be a strength to favor communication between levels of care and, therefore, their cooperation [29]. Workload increases due to the scarcity of resources (high patient/professional ratio) and also reduces the time available to provide quality care [29]. Thus, holistic care with the involvement of a multidisciplinary team with good communication between its members would favor the ability to address PNs [14].

While both physicians and nurses generally agreed on the difficulties, physicians placed more emphasis on the lack of training whereas nurses highlighted the fear of emotional exhaustion. In the hospital setting, there is more concern about compassion fatigue where involvement in psychosocial care can lead to emotional exhaustion [27]. Nonetheless, there are authors who emphasize the emotional implication [14] and teamwork [28] as a source of growth, professional satisfaction, and a protective factor against burnout. Additionally, in this environment, working in shifts worsens communication between professionals, and the high workload makes it difficult to deal with PNs because it requires time that may be unavailable.

The last category expressed by the professionals was information on available resources, with nurses relying especially on family and patient associations and physicians assuming that they should be more proactive in their advice on such resources. Regarding the setting, in the hospital, not all cases were considered to need a psychosocial assessment, with referral to a social worker or psychologist/psycho-oncologist when necessary, whereas in primary care, the professionals considered that they were capable of providing support without the need for referral. According to the literature consulted, the role of psycho-oncologists is highly appreciated by nurses and physicians; however, these professionals consider that few cases were referred to them, probably due to the stigma that patients feel toward psychological care and that referrals were made late [29]. Access can be complicated by problems such as waiting lists or noncoverage of this resource by the healthcare provider [25, 29]. Professionals value the family as a support resource from admission to care at discharge, appointments, and treatment plan and have an important role in patient groups and associations [29]. A systematic assessment of patients also helps to identify their family support network, and knowledge of their community assets helps to find resources to turn to for help.

From the point of view of nursing management, understanding the psychosocial needs of cancer patients places an additional demand on nursing staff. By acknowledging this, we underscore the importance of maintaining an appropriate patient-health professional ratio to ensure the delivery of comprehensive psychosocial care. Empowering nurses with the tools and resources to provide optimal psychosocial support can significantly impact the overall well-being of patients. There is evidence that assessing and addressing psychosocial needs in patients with cancer not only is effective but may also be cost saving, because the psychological problems oncological patients are associated with increased healthcare use, healthcare costs, and

economic losses [30]. In addition to the cost effectiveness and cost-utility of psychosocial care, it can be hypothesized that the provision of psychosocial care can reduce both productivity losses and costs of providing informal care [31]. The provision of Psychiatric Mental Health Nurses consultation liaison services contributes to the detection and treatment of individuals with mental healthcare needs in nonmental healthcare settings as oncological services. Psychiatric advanced practice nurses are in the best position to identify the mental health needs of patients and enhance their health-related outcomes [32].

4.1. Limitations and Recommendations. This study has a number of limitations. Although we have had access to professionals (physicians and nurses) from various hospital and primary care services, it would be appropriate to incorporate other services (e.g., oncology day hospital or palliative care unit), considering the characteristics of the hospitals (hospitals >1000 beds vs. hospitals <200 beds) and private centers in order to have a more global view of the phenomenon. It would also be appropriate to continue this line of research by giving a voice to the patients themselves and their relatives in order to confirm our results. Another limitation is that only semistructured interviews were used for data collection. It would be advisable to complement this study by incorporating other qualitative methodologies such as participant observation or focus groups, and even to propose mixed-method studies with quantitative research.

5. Conclusions

According to the perspective of nurses and doctors, psychosocial needs are highly relevant in patients with cancer, as they often require emotional support to cope with a radical change in their lives. However, not enough professional importance is given, and most likely the emotional sphere is neglected because of the priority given to physical or therapeutic needs. The self-perceived role of nurses and physicians differs regarding PNs. Thus, nurses highlighted the need for these patients to receive emotional support and care whereas the role of physicians was more focused on referring these patients to other health professionals. The ideal network would be based on the primary care team as care coordinator and supported by multidisciplinary teams with specialized training, communication skills, time for comprehensive quality care, and information about resources. Through organizational measures and increased resources, the workload can be reduced to systematize the detection of PNs during the health professionals' daily work.

5.1. Implications for Nursing Management. Nurses claimed to be the ideal profession for the detection of psychosocial needs; however, it is necessary to improve nursing assessment and care plans and to give more importance to these needs in patients with cancer. Nursing management positions should be more sensitive to the time and training needs of nurses that can have a major impact on providing better care for people with cancer.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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Research Article

Exploring the Dynamics of Attracting and Retaining Acute Care Psychiatric Registered Nurses: An In-Depth Analysis Using Focus Groups

Kendra L. Ratnapradipa ^{1,2}, **Julia F. Houfek** ³, **Phoebe Gearhart**⁴, **Erin O. Schneider** ¹,
Christine Chasek ^{1,5}, **Danae Dinkel** ⁶, **Katrina M. Cordts** ^{1,7}, **Marley Doyle** ^{1,8},
Priyanka Chaudhary ⁶, **Deepanjali Bhale** ¹ and **Shinobu Watanabe-Galloway** ^{1,2}

¹Behavioral Health Education Center of Nebraska (BHECN), University of Nebraska Medical Center, 984242 NE Medical Center, Omaha, NE 68198-4242, USA

²Department of Epidemiology, College of Public Health, University of Nebraska Medical Center, 984395 Nebraska Medical Center, Omaha, NE 68198-4395, USA

³College of Nursing, University of Nebraska Medical Center, 985470 Nebraska Medical Center, Omaha, NE 68198-5470, USA

⁴Department of Psychiatry, Nebraska Medicine, Omaha, NE 68198-5578, USA

⁵Department of Counseling, College of Education, Health & Human Sciences, University of Nebraska Omaha, Omaha, NE 68182, USA

⁶School of Health and Kinesiology, University of Nebraska Omaha, Omaha, NE 68182, USA

⁷Department of Neurological Sciences, College of Medicine, University of Nebraska Medical Center, 985920 Nebraska Medical Center, Omaha, NE 68198-5920, USA

⁸Department of Psychiatry, College of Medicine, University of Nebraska Medical Center, 985575 Nebraska Medical Center, Omaha, NE 68198-5575, USA

Correspondence should be addressed to Kendra L. Ratnapradipa; kendra.ratnapradipa@unmc.edu

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The recruitment and retention of in-patient psychiatric mental health registered nurses (PMH-RNs) remains a challenge. This qualitative study sought to identify factors impacting the recruitment and retention of PMH-RNs in acute-care settings. Participants ($N=15$) were recruited for focus groups including one with in-patient unit administrators ($n=4$), two with current PMH-RNs ($n=7$), and two with nursing students ($n=4$). Data were analyzed using a directed content analysis approach. Participants were informed about the study's purpose, procedures, potential risks, and benefits, and they provided verbal consent before participating. Administrators emphasized a focus on retention and described a variety of supports they provided PMH-RNs, including formal and informal support and education. PMH-RNs' most prevalent concerns were their safety, co-worker and/or management challenges, and emotional and/or physical exhaustion. Students also expressed concerns about safety in psychiatric settings and desired more interaction with PMH-RNs. They were also interested in learning more about the specialty as they valued the opportunity to see change in patients. All three groups mentioned a need for more interaction between students and PMH-RNs, while safety concerns were expressed by both PMH-RNs and students. Because PMH-RNs play a critical role for in-patient psychiatric care, recruiting and retaining specialist nurses can focus on increasing student engagement with the PMH-RNs, attending to PMH-RNs' management and staffing concerns, and providing additional resources for responding to events that threaten safety in the workplace to prevent burnout.

1. Introduction

The US has experienced an increased demand for mental health services, in part due to sequelae from the COVID-19 pandemic [1, 2]. A 2022 national survey found that while 42% of US adults reported needing mental health care and 24% reported needing substance use care in the previous 12 months, 43% of respondents also indicated they did not receive needed care [3]. Barriers to accessing mental health care include shortages of mental health providers, geographic maldistribution of providers, a decrease in psychiatric in-patient beds, and a lack of knowledge about how to access care [3–6].

The increased need for mental health care in light of the pandemic has also affected clinician well-being, prompting a call to recognize and address provider stressors [7]. Workplace violence in psychiatric settings, including abusive incidents and threats to safety, affects care delivery and provider health [8, 9]. Psychiatric mental health nursing (PMHN) has responded to the ongoing shortage of mental health providers and these workplace stressors by defining and characterizing the PMHN workforce, describing strategies to meet provider shortages, and encouraging PMHN to champion clinician well-being [5, 10–16].

The PMHN workforce, comprised of both Registered Nurses (RNs) and Advanced Practice Registered Nurses (APRNs), is the second largest group of US mental health professionals [13]. PMHNs play a unique and critical role in providing interdisciplinary, collaborative mental health treatment and care [11, 13]. The majority of PMH-RNs reported practicing in a hospital setting [12]. PMH-RN responsibilities include assessing mental health, applying the nursing process to develop diagnoses and care plans, and administering and monitoring psychobiological treatments [17].

Recruitment and retention of PMHN has been a longstanding concern for the specialty [18–21]. A 2022 survey by Nursing Solutions, Inc. (NSI) of 273 US hospitals reported the turnover rate for PMH-RNs was 20.8%, slightly lower than the 2021 rate of 23.4% and lower than the 2022 average turnover for RNs (22.5%) employed by reporting hospitals [22]. However, the NSI study also reported that behavioral health units experience a 100% cumulative turnover rate of PMH-RNs over five years [22]. Responding hospitals reported that the top ten reasons (in descending order) for RNs leaving their positions were: personal concerns, career advancement, relocation, salary, retirement, unknown reasons, education, scheduling, workload or staffing ratios, and commute. Three of these reasons (retirement, education, and career advancement) are also supported in the literature about psychiatric nursing [11, 12, 23]. A recent PMHN workforce survey found that over half (52.6%) of PMH-RN respondents were in their 50s and 60s, indicating an aging workforce nearing retirement [12]. This 2022 workforce survey found that the number of PMHNs completing a graduate degree since 2010 almost doubled [23], suggesting that at least a portion of PMH-RNs pursue a graduate degree to advance their nursing careers. A reason that may underlie other turnover factors cited in the NSI study is the need for

support and mentoring of RNs new to PMHN practice [19], such as nurse residency programs [21], and continuing education focusing on best PMHN practices [18]. Finally, due to stigma, psychiatric nursing is not seen as a desirable or valuable nursing specialty and may hinder recruitment of students and RNs into PMHN [11, 19, 23].

Recruitment and retention of PMH-RNs are crucial in mental healthcare shortage areas. It is estimated that the shortage of mental health providers across the US affects 163 million people who need care [24]. Nebraska is one state that has a severe shortage of mental health providers, with 90 of 93 counties designated as mental healthcare shortage areas. While an estimated 3.7% of US RNs cited PMH/substance abuse as their primary nursing specialty [25], only 2.9% of Nebraska RNs and APRNs cited PMHN as their primary practice during license renewal [26]. According to a 2020 survey, 10% of urban and 44% of rural responding Nebraska healthcare facilities that employed PMHN contracted for these nurses in the past six months citing lack of applicants, lack of qualified nurses to fill positions, and a need to cover for the absence of regular staff [27]. Two-thirds of the urban healthcare facilities and half of rural facilities who responded to a question about time needed to fill psychiatric nursing positions indicated recruitment spanned four or more months.

Because PMH-RNs' provide essential care, it is important that we better understand PMH-RNs choice of specialty and working environments that promote or deter their recruitments and retention. The Behavioral Health Education Center of Nebraska (BHECN) is a state-funded behavioral health workforce development center with a mission to recruit, train, and retain the behavioral health workforce. To accomplish its mission, BHECN has an interest in understanding PMH-RNs' perspectives related to choosing to practice psychiatric nursing and conditions which help or hinder providing psychiatric nursing care. Therefore, we conducted a study to describe: (1) reasons for PMH-RNs staying or leaving their acute-care psychiatric nursing position and (2) recommendations to improve recruitment, retention, and training of PMH-RNs. Nurse managers are directly responsible for the recruitment and retention of nursing staff and for safe, effective working environments. Results of this study will provide knowledge of PMH-RNs' perceptions of their work environments and their role in clinical care. Understanding these perspectives can help nurse managers provide responsive clinical leadership to help maintain and grow the PMHN workforce.

2. Conceptual Background

Behavioral health workforce development is guided by a Career Pathway or "pipeline" approach for recruitment and retention of providers, including psychiatric mental health nurses [28, 29]. This heuristic provides a systematic approach to career development starting with career education in elementary school and continuing through completion of postsecondary coursework and entry into the workforce [30]. The Pathway approach includes formal or informal mentoring of students by practicing providers. It

also includes students' exposure to actual practice environments through clinical experiences as part of their academic coursework, internships, and observational experiences. Encouraging and mentoring interested students to explore behavioral health careers can stimulate and sustain their interest in these careers [31]. Interacting with the Career Pathways approach are academic-practice partnerships in nursing. These partnerships aim to strengthen collaboration between schools of nursing and health care institutions to improve the quality of both nursing education and clinical nursing care [32]. Academic-practice partnerships can provide the infrastructure for mentoring aspiring psychiatric mental health nurses as well as foster nurses' continuing career development to promote retention. To assure that recruitment and retention efforts for psychiatric mental health nurses address local needs [33], we used qualitative methods to explore PMH-RNs reasons for staying or leaving their acute-care psychiatric nursing positions and their related recommendations for recruitment and retention of PMH-RNs.

3. Materials and Methods

Prior to data collection, the study was screened by the University of Nebraska Medical Center's Institutional Review Board. Because BHECN is a workforce development center and the study was asking about professional practice, the study did not constitute human subjects research as defined at 45CFR46.102 and was exempt from IRB oversight. The study was conducted in accordance with ethical principles including (verbal) informed consent prior to beginning the audio recording. Transcripts were blinded to preserve participant anonymity.

3.1. Participants. Inclusion criteria included being from Nebraska institutions or facilities and being an administrator who supervised PMH-RNs in acute-care settings ($n = 4$), a nurse who practiced as a PMH-RN with current or prior experience in acute-care settings ($n = 7$), or a nursing student who had a psychiatric rotation ($n = 4$).

3.2. Recruitment. We used targeted recruitment through partnerships and personal contacts to advertise the study to organizations and institutions that employ PMH-RN. Additionally, BHECN collaborates with a network of academic programs whose mission is to develop the behavioral health workforce, including the three psychiatric-mental health graduate nursing programs in the state, which advertised the study to students.

3.3. Focus Group Facilitation Guides. Separate facilitation guides were developed following a literature review to identify potential reasons for PMH-RNs leaving their jobs: (1) lack of training to gain necessary skills and knowledge to fulfill PMH-RN responsibilities [18, 34, 35], (2) bullying by other PMH-RNs [36], (3) workplace violence [8, 9], (4) lack of administrative support [37], and (5) lack of resources to improve mental health of PMH-RNs [38].

3.4. Data Collection. Five groups (one administrator, two PMH-RN, and two student groups) were held to accommodate scheduling. Sessions lasted approximately 60 minutes and were facilitated by a PMHN, a social worker, and an epidemiologist between December 14, 2021 and March 18, 2022. The PMHN was prepared to address potential participant distress in discussing workplace violence. Focus groups were conducted via Zoom, audio recorded, and transcribed verbatim. Participants received a \$50 gift card for their participation.

3.5. Data Analysis. Interviews were uploaded into NVivo for analysis using a directed content analysis approach [39, 40]. Two researchers with extensive qualitative analysis experience read through the transcripts several times. The lead analyst (DD) developed codes and a codebook identifying main categories through a deductive approach, which followed the interview guide and inductive development of subcategories along with definitions for each category of participants. A second researcher (PC) reviewed all coding, noting discrepancies, and the two met to resolve conflicts and reach consensus.

The analysts presented the initial coding structure to the research team who provided feedback. Next, the lead analyst reviewed and revised the data based on the feedback, making minor revisions to the codebook. The second analyst then reviewed all coding a final time, noting discrepancies and the two researchers met again to discuss until reaching consensus. Anchor quotations were identified for each main theme. Data credibility relied on data triangulation from the perspectives of administrators, nurses, and students and investigator triangulation by obtaining coding feedback from multiple researchers [41]. An audit trail was used for dependability and confirmability [41].

4. Results

Fifteen people participated in five focus groups: one administrator group ($n = 4$), two PMH-RN groups ($n = 4$, $n = 3$), and two nursing student groups ($n = 2$, $n = 2$). All administrators and students were females. Two PMH-RNs were male and the remaining were females. All PMH-RNs had left acute-care and were working in outpatient settings at the time of the study. They had 71 years of cumulative experience (range 1–37 years) in psychiatric nursing in any setting, but primarily in acute-care units. Table 1 summarizes the themes by participant category with illustrative quotations.

4.1. Administrators

4.1.1. Recruitment Challenges Lead to a Focus on Retention. Recruitment was a significant challenge identified by administrators. The pandemic was mentioned as a contributing factor, citing nurses' ability to obtain higher wages at other health care organizations and the challenges of the pandemic increased older nurses' desire to retire. An administrator said, "We had five agency nurses that were on two back-

TABLE 1: Themes and illustrative quotations.

Group	Theme	Subtheme	Illustrative quotations
Administrators	(1) Recruitment challenges led to a focus on retention	(a) Recruitment was challenging but slightly improving	(i) "We've had three offers out waiting on two, one has accepted so we are now seeing folks coming and wanting to come into behavioral health." (ii) "I'd say about 2 months ago... we started to see a lot of applications had quite a few new hires, 6–8 months prior to that, it was like, okay, is everything in there [application site] right?"
		(b) Focus on retention	(i) "We have another process that if a staff is injured, we follow up with them and several people involved in that and really doing a dive into supporting them through that process, and I think all of that has been helpful for retention." (ii) "Everybody else is doing increasing wages and doing retention bonuses and all those types of things."
	(2) Ongoing processes and support for nurses	(a) Varied and individualized onboarding process (b) Ongoing formal/informal support provided	(i) "...so we make sure that we're talking about more experiences that the orientee needs to have. Are there areas that we need to reinforce, areas that are going well, those type of things so we can keep tailoring it to the needs of the person..." (ii) "So we have a policy on workplace violence, and we put a lot of effort around staff doing incident reports, if they're witnessing it or if it's happening and to come forward, there's an anonymous way to report it." (iii) "We have that stress first aid program, and then we utilize EAP quite a bit..." (iv) "...we brought in individuals who were trained in crisis intervention, how to deal with a violent episode to kind of work through those feelings... I think the ability to have a 911 [emergency] support person to come in and triage, that would be great." (v) "...keep working on getting started in high schools and getting kids interested in mental health."
Nurses	(1) Experience and challenges of their profession	(a) Benefits of the profession	(i) "It's just very rewarding watching people recover from a very, very dark place and just seeing that personal growth and self-discovery." (ii) "...one person can have an impact on one other person, and if you can be that person and have an impact and totally change their life." (iii) "I've worked in some places that have been really unsafe where staff are getting seriously injured or patients are getting injured... and I'm not willing to work in a unit or a facility that has those core safety concerns." (iv) "I've definitely seen a lot of conflict between disciplines and roles when it comes to this career field and my first job there was a lot of conflict because our techs were high school diploma or GED techs, and there was challenges with that. And then my second job, all of our techs had to have at least a bachelor's degree in a related field so that improved a lot of the morale and decreased a lot of the conflict."
		(b) Challenges of the field	(i) "That's where I learned most of my stuff is from veteran nurses who have been through it, and so venting to them after a situation like this really is helpful to me and to get their support and feedback about what happens." (ii) "I would say I'm having more phone conversations with people to let some of that out, whereas, you know it used to be face to face, but now it's more on the phone."
	(2) Sources of current support (formal, informal, and self-care activities)	(i) "We need to find courage from each other. So, if we just had a little more support, I believe the emotional stuff we go through would be beneficial." (ii) "...but also maybe Q&A would be the right word, for people to just talk with other psych nurses, ask the questions they have or definitely like I've already said, I would love to be a preceptor."	
	(3) Need for additional support		

TABLE 1: Continued.

Group	Theme	Subtheme	Illustrative quotations
	(1) Mental health experience	(a) Previous/current work and personal experience	(i) "I feel like we've gotten to see a good variety of psychiatric diseases and mental health disorders and all of that just on like Med Surg floors and everything." (ii) "I specifically work at [a rehabilitation facility] and so by working there I feel like I get to work a lot not just in behavioral health but also like helping patients with their physical health. . ."
		(b) Clinical experience	(i) "So we got to observe quite a few mental status exams, a lot of therapeutic communication and trying to de-escalate situation as well as . . . their daily routine. . . the nurses were kind of spread thin so were in the way a lot trying to help them. . ."
Students	(2) Concerns about the PMH specialty		(i) "I've been hearing it . . . just [students] thinking it's all violent patients but it's not. I think that's a big thing that worries some people." (ii) "I also said that my biggest concern is safety."
	(3) Desire to know more about and interest in psychiatric nursing		(i) "They (nurses) sit in with the doctor, with the patients, and kind of talk about what's going on. We haven't had the opportunity to attend those meetings yet and I kind of would like to. I think it would be interesting to hear about and observe how those meetings [go] . . ." (ii) "I really wish we would be able to follow those nurses on the psych unit . . . on a nursing standpoint, we're not getting anything really, truly productive out of it."

to-back contracts, and they all left at the same time when COVID[-19] kind of changed their income and so they took contracts elsewhere.” Other known reasons for nurses leaving were a desire to work with a different population or to have more flexible hours. Despite challenges, administrators felt positive that recruitment was improving as they started to get more candidates and were filling open positions. An administrator described how six to eight months prior they only had a few candidates for open positions but now “we’ve had three offers out waiting on two, one has accepted so we are now seeing folks coming and wanting to come into behavioral health.”

Employee retention was a major focus, viewed as a long-term process that starts with recruitment and “pipeline” development. One strategy was precepting students as part of concentrated clinical learning experiences. A participant noted, “We’ll be precepting two students that have an interest in Psych. . .and so we would be interested in offering them positions if things work out and so (we are) kind of excited to have that opportunity.” Another noted the importance of starting early and a need “to keep working on getting started in high schools and getting kids interested in mental health.”

Administrators also indicated their organizations were increasing wages and/or providing support to reduce stress to improve retention. As one participant mentioned, “We have another process that if a staff is injured, we follow up with them and several people involved in that and really doing a dive into supporting them through that process, and I think all of that has been helpful for retention.” While much of the discussion revolved around trying to recruit and retain nurses in the short term, one administrator did note the importance of other programming to ensure they stay long term.

4.1.2. Ongoing Processes and Support for Nurses. Administrators had a variety of processes to onboard new nurses to their facility, including a mixture of online and in-person training with mentorship from more experienced nurses. Administrators appeared to primarily focus on individualized onboarding, which was often based on the nurses’ previous experience as well as the type of position (e.g., contract vs. full-time).

Administrators mentioned a wide offering of support for their staff, including formal processes (e.g., Employee Assistance Programs (EAP), wellness committee events), informal processes (e.g., mentor), and education or training (e.g., ways to prevent lateral violence or hostility between co-workers). While none of the administrators discussed any instances of workplace bullying or violence, two mentioned they had direct training about it. For example, one administrator said, “So we have a policy on workplace violence, and we put a lot of effort around staff doing incident reports, if they’re witnessing it or if it’s happening and to come forward, there’s an anonymous way to report it.”

Specifically when discussing how they supported staff following a violent event or altercation involving a patient, administrators mentioned they primarily focused on

convening huddles immediately following the event to debrief. If administrators noticed a staff person needing additional support following the event, they would individually reach out. As one participant noted, “The debriefing and then if it’s very apparent that somebody really needs some support, then we individually reach out to them and just offer that assurance and refer them to EAP if need be.”

4.1.3. Needed Support for Nurses and the Profession.

When discussing ways to better support PMH-RNs and the nursing profession in general, administrators identified several ideas including a need for care options, in-depth or triage support, and engaging high school students. Regarding a need for more care options, two administrators mentioned the lack of facilities for extremely violent patients as a challenge. An administrator explained, “you’re often looking at months (to get them into a more secure facility); we are not equipped to handle people that are extremely violent to other staff. . .as well as to other patients.” Another administrator described a need for better triage support following staff injury. This administrator stated “. . .we brought in individuals who were trained in crisis intervention, how to deal with a violent episode to kind of work through those feeling. . .I think the ability to have a 911 (emergency) support person to come in and triage, that would be great.”

4.2. Nurses

4.2.1. Experience and Challenges of Their Profession. All PMH-RNs described how they valued their profession and found it rewarding. One nurse said, “It’s just very rewarding watching people recover from a very, very dark place and just seeing that personal growth and self-discovery.” However, all the nurses had left acute care and approximately half had considered leaving PMHN altogether. Despite a variety of challenges expressed, the most often expressed concern was about their own safety and previous encounters with violence. As one participant explained, “I’ve worked in some places that have been really unsafe where staff are getting seriously injured or patients are getting injured. . .and I’m not willing to work in a unit or a facility that has those core safety concerns.” Other top concerns were challenges with co-workers or management and feeling unappreciated. One nurse described a previous facility and why she left, “. . .the lateral incivility at work, leadership didn’t listen at all, and there was no training there.”

Nurses expressed they were emotionally and/or physically exhausted and that the COVID-19 pandemic led to burnout. As one nurse noted, “. . .burnout (has been) a huge aspect (with) psych nurses just because our patient care is so difficult. . .but COVID[-19] especially made it worse.” Mask policies during the COVID-19 pandemic also presented a challenge. “When you have someone who’s in psychosis or manic and very paranoid, having to wear a mask around them hinders your ability to form any kind of therapeutic relationship.” Other concerns or challenges mentioned by nurses included dealing with staffing shortages, a lack of

community support or understanding for mental health, and maintaining work/life balance. For example, one nurse stated, "I think that a lot of times people, when you tell them you work in Psych, they have an idea of what that means and it is not what it really means. . . I don't think people understand mental illness at all." The need to provide staffing seven days a week for in-patient settings was also a challenge. One nurse mentioned, "It's hard for my family, I have a baby at home and it's hard to work every other weekend and to be obligated to work holidays as he's growing up, I'm not sure I'm willing to do that."

4.2.2. Sources of Current Support. Like the administrators, nurses described various formal (e.g., EAP and wellness committee events) supports, although not all participants were familiar with these resources. The primary source of informal support focused on conversing with peers and veteran staff. For example, one nurse said, "That's where I learned most of my stuff is from veteran nurses who have been through it, and so venting to them after a situation like this (a violent event or situation) really is helpful to me and to get their support and feedback about what happens." Nurses also discussed various self-care strategies that supported their mental and physical well-being, including conversing or spending time with friends, exercising, spending time alone or with family, although some of these practices were impacted by the pandemic. One nurse said, "Exercise for me, but you couldn't go to the gym with COVID[-19]." Consistent with the administrators, nurses mentioned the primary support following a violent event was through debriefing huddles. One nurse stated, "Everybody involved in the situation will always get together and we kind of talk about what happened, what went well, what didn't go well."

4.2.3. Need for Additional Support. Although the PMH-RNs mentioned huddles as a supportive process, not all the participants felt they were useful as implemented. A participant explained how the huddles actually led to increased stress by taking involved staff away from their other duties, particularly when working on an under-staffed unit.

"It was just kind of, OK, we have to do this. . . We're going to have, you know, 30 seconds and we're just going to move on, without really the full weight of what can we learn from this situation. . . In spite of conversations that were had, (administrators) were very good about superficial level saying, yeah, we were listening, we care, but we're not going to do anything different than this process. . ."

"Or we have this safety huddle, which most of the people that seem to go to that seemed to have all the time in the world to spend all this time discussing all this stuff. I was like, I have to get back down there, there's only one person down there. The environment, it just didn't seem like the rest of the world understood what was actually happening on the unit and how really unsafe at times. . ."

PMH-RNs described multiple needs for additional support for themselves and the profession. One frequently mentioned need was for additional staff at in-patient facilities; however, this was usually in reference to prior positions. Another requested item was more support following a violent event, exemplified by "there needs to be. . . more support for that because it can be physically as well as mentally damaging to be assaulted." Relatedly and like administrators, PMH-RNs mentioned a need for more care options, including residential options and housing. Other support for current PMH-RNs included more education and more support from co-workers. One nurse stated, "We need to find courage from each other. So, if we just had a little more support, I believe the emotional stuff we go through would be beneficial."

To support interest in their profession, another top need identified was for increased interaction with students. PMH-RNs had different ideas on how to best do this, such as having a mandatory psychiatric nursing clinical rotation or having opportunities to present to students to explain the psychiatric nursing role. One nurse described that in her first job, she would ". . . talk about what I did and what my career was, I think that if real psych nurses did that in schools, it could be beneficial."

4.3. Students

4.3.1. Mental Health Experience. Students' clinical rotation experience varied in length (8–14 weeks) and the number of sites (1–3). When discussing their experiences with mental health patients, students most often described their experience through either their own work, personal experience, or other clinical rotations. A student said she had been "a CNA (certified nursing assistant) for the last 10 years. . . we do see a lot of psych cases. . . so that is kind of helpful to have that experience." Regarding experiences in other rotations, a student noted, "I feel like we've gotten to see a good variety of psychiatric diseases and mental health disorders and all of that just on like Med Surg floors and everything." However, students felt like they had gained little experience with PMH-RNs and had a limited understanding of what PMH-RNs actually do. One student stated, "A lot of what they do is passing meds and making sure everyone is compliant with their medication." While another student said, "I think a lot of students don't really understand it."

4.3.2. Concerns about the PMH Specialty. Students' primary concern was safety and experiencing violent patients. A student mentioned concerns she heard from other students, "I've been hearing it. . . just (students) thinking it's all violent patients but it's not. I think that's a big thing that worries some people." Another stated "I think for me, at least, a big concern with that is safety. A lot of what I've seen is nurses not handling the situation as well as they could of." The other major concern about PMHN was the stigma associated with mental health. One student described that despite advancements in education and increased awareness of mental health issues, there is still a significant stigma that exists;

however, she believed the nursing students needed to become more comfortable working with mental health patients as “. . . you are going to have these patients no matter what.”

4.3.3. Desire to Know More about and Interest in Psychiatric Nursing. Despite their concerns, students wanted to learn more about and were interested in psychiatric nursing. When asked about their experience on getting more involvement working around PMH-RNs, they desired to have more direct interaction with nurses and to see PMH-RNs in a greater variety of settings. One student said, “They (nurses) sit in with the doctor, with the patients, and kind of talk about what’s going on. We have not had the opportunity to attend those meetings yet and I kind of would like to. I think it would be interesting to hear about and observe how those meetings (go). . .” Additionally, following the completion of the questions in the focus group guide, the students had multiple questions about the experiences of the facilitator, an experienced PMH-RN who had worked in a variety of settings. Students asked her to explain more of what she did as a psychiatric nurse, what a typical case load was like, and what the typical hours were. Students’ motivation to join the field appeared to stem from a desire to see positive change in patients. They believed psychiatric nursing would allow them to care for patients in ways that promote recovery/remission and an overall better quality of life.

5. Discussion

The purpose of this study was to understand the perspectives of administrators, PMH-RNs, and students on factors affecting recruitment and retention of acute-care PMH-RNs. Three commonalities across these groups emerged. First, each group desired more interaction between nursing students and PMH-RNs. Administrators identified preceptorships as a method to recruit students into the PMHN specialty. PMH-RNs perceived that students were not familiar enough with the specialty. Students indicated that clinical experiences do not give them enough interactions with PMH-RNs and asked many questions about the roles of PMH-RNs. As commented by nurses and administrators, experienced PMH-RNs are a great asset for the organization, newly hired nurses, and patients. Based on PMH-RNs suggestions, nursing classroom experiences could include presentations by clinical PMH-RNs to demystify the roles and functions of PMH-RNs and encourage students to choose psychiatric nursing as their clinical specialty.

Nurses believed psychiatric nursing rotations should be mandatory for nursing students, but students thought all nursing students receive some kind of experience and knowledge about psychiatric care, even if not directly through a psychiatric rotation. Undergraduate nursing programs have latitude in meeting accreditation standards of professional nursing organizations and state boards of nursing but are limited by the amount of information needed to be presented within the program’s credit hours. Although basic psychiatric nursing knowledge and skills are taught based on national standards [42], programs vary in

the type and length of psychiatric clinical experiences, resulting in limited opportunities for learning the in-patient psychiatric nursing role in some programs. Thus, more concerted curricula efforts are needed to attract nurses to practice psychiatric nursing. Developing academic-practice partnerships, practice models that integrate best psychiatric nursing practices with clinical simulation, and basic competencies for psychiatric nursing faculty and preceptors have been identified as priorities to improve PMHN education [35]. Mentoring students by PMH-RNs through classroom presentations or through preceptorships are examples of the types of academic-practice partnerships that will give students an opportunity for additional PMHN experiences without straining current content or increasing clinical credit hours.

Second, all groups addressed safety concerns experienced by PMH-RNs with extensive discussion about violent incidents and how such incidents can physically and psychologically affect nurses. Based on our results, violent encounters with patients were not an infrequent occurrence in psychiatric acute-care settings. While there are some safety protocols and follow-up measures being implemented, nurses expressed their desire to see more investment of resources to prevent violent encounters and support nurses after incidents occur.

At the organizational level, the prevalence of workplace violence is significantly higher in psychiatric settings than in other healthcare settings [9]. A national survey of PMHNs found that less than two-thirds of participants reported feeling safe or very safe in their workplace [23]. Similar to our findings, survey participants cited patient acuity, need for administrative support, lack of staff training, and low staff-to-patient ratios as factors contributing to unsafe work settings. In addition, nurses in our focus groups cited support from colleagues, conducting debriefing “huddles” with consideration for nurses’ other duties, and providing quality nursing care after a violent patient-care event as protective factors for retention. Experienced nurses serving as mentors were cited as valued, supportive colleagues, so retirement of nurses may limit the availability of experienced nurses who can serve in this role.

Administrators and nurses in our study indicated their environment is not equipped or suitable for the level of care some patients need. Administrators noted long wait-times to transfer patients with more severe illness to other psychiatric facilities, which reflect the national shortage of psychiatric beds [4]. PMH-RNs also indicated a need for more residential facilities and better housing in the community for patients, suggesting that nurses understood that social determinants of health contributed to patients’ relapse and need for hospitalization. Relatedly, a shortage of healthcare providers in psychiatric nursing settings contributed to the inability or difficulty handling violent incidents as suggested in the literature [43]. Nevertheless, it is important to better support psychiatric nursing staff as evidence indicates that workplace assault or violence is positively associated with occupational stress and negatively associated with well-being [9].

Third, nurses and students commented on the stigma of caring for patients with mental illness. While there has been an increased awareness of mental illness in the general population [44], stigma is still associated with mental illness in the US. Negative views about mental illness can translate to negative perceptions of the psychiatric nursing workforce. Stigma within nursing education programs and the belief that medical-surgical experience is needed prior to specializing in PMHN further contribute to recruitment barriers [19, 23]. Phoenix suggested that because psychiatric nursing work is largely relationship-based and lacks the profession's visual signifiers (e.g., stethoscopes and scrubs); it can be a disadvantage for recruiting nurses into the specialty [13]. Students said that they cared for patients with mental health needs in medical-surgical settings, so developing experiences for PMH students in primary care that address patients' physical and mental health needs can enhance PMH-RNs' ability to provide integrated care [45] and may increase students' interest in PMHN.

Previous studies found that at the individual level, negative attitudes of psychiatric nursing as a career [46], stress, burnout [47], and lower job satisfaction [48] may explain the high turnover intention in PMH-RNs. Participants in our focus groups also identified these factors. At the organizational level, lack of in-service education and advanced training [34], negative working relationships [33], and procedural fairness concerning performance appraisal [49] were found to be associated with higher turnover intention. In our study, comments from PMH-RNs suggested that lack of training and interpersonal problems among staff were reasons for leaving the in-patient setting. Although PMH-RNs appreciated administrative support from nurse managers, they also indicated additional types of support were needed. Exploration of leadership roles of unit-level nurse managers may help identify those that enhance staff satisfaction as well as patient care. For example, Perkins, Bamgbade, and Bourdeanu found that higher job satisfaction was related to managers who were able to mentor staff, monitor the unit milieu, and direct unit activities by clarifying expectations and problem-solving [50]. While staffing issues, such as 24-hour coverage and weekend work, are similar across in-patient settings, they may add to PMH-RNs' decisions to take noninpatient positions in PMHN or other specialties, especially if other aspects of the clinical setting are negative.

Addressing nursing turnover is critical as it can decrease the quality of care and increase hiring costs for hospitals [51]. The average cost of turnover for a bedside nurse is \$52,350 and a 1% decrease in nurse turnover saves a hospital \$380,600 per year [22]. With mental health issues on the rise and increasing turnover and dissatisfaction among the current nursing workforce, it is critical to improve the physical and mental well-being of PMH-RNs and increase retention rates. Additionally, it is imperative government agencies and healthcare systems understand the significant contribution of psychiatric nursing in mental health treatment [13] and ways to recruit nurses into this specialty.

Study limitations include the small sample size. Despite extensive outreach efforts to recruit, only PMH-RNs who

had left the acute-care setting agreed to participate, so we did not have the perspective of PMH-RNs who currently work in an acute-care facility which may bias results. Inpatient staffing shortages and high levels of COVID-19-related provider stress may have deterred in-patient PMH-RNs from participating. However, some participants had more than 10 years of experience in the in-patient PMH setting. All participants were recruited from urban healthcare facilities or colleges, which limits generalizability. Additionally, the virtual Zoom sessions may have affected information sharing. Nonetheless, identified themes were congruent with other studies and provide insight into the psychiatric nursing experiences of administrators, PMH-RNs, and students. These experiences provide a basis for recommendations to enhance recruitment and retention of PMH-RNs.

6. Conclusions

This qualitative study described perspectives about recruitment and retention of PMH-RNs. Interview data from administrators, PMH-RNs, and students indicated that increased interactions between students and PMH-RNs would increase students' interest in psychiatric nursing as well as satisfy PMH-RNs' desire to promote their specialization. Workplace violence and stress, exacerbated by understaffing, lack of understanding of the PMH-RN role, and stigma about mental health were cited as negatively affecting both recruitment and retention of PMH-RN in acute-care settings. Recommendations for improving recruitment and retention include strengthening academic-practice partnerships, increasing resources to prevent and address the aftermath of patient-initiated violence, and promoting the public visibility and importance of psychiatric mental health nursing.

Moving forward, it is crucial to consider the insights provided by this study to formulate effective strategies for improving recruitment, retention, and training of PMH-RNs. By implementing targeted interventions, such as nurse residency programs, continuing education initiatives, and efforts to combat stigma surrounding psychiatric nursing, the aim is to create supportive and conducive working environments that encourage the growth and sustainability of the PMHN workforce. These measures are vital for creating supportive environments that foster the growth and sustainability of the PMHN workforce, ultimately ensuring high-quality mental health care for those in need.

Data Availability

The focus group transcript data used to support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure

The research was conducted as part of BHECN's statewide behavioral health workforce development efforts and not

directly related to the practice locations or participants in the study.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' Contributions

Co-authors affiliated with BHECN planned, conducted, and wrote up the results of the project with collaboration with external partners.

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Research Article

Exploring the Influence of Demographic Factors and Flourishing on Workplace Distractions: A Cross-Country Analysis

Emad Shdaifat ¹, Tamadur Shudayfat ², Noha Al-Shdayfat,^{2,3} Nora Alotaibi,¹ and Mona Alduhaileb⁴

¹Community Nursing Department, College of Nursing, Imam Abdulrahman Bin Faisal University P.O. Box 1982, Dammam, Saudi Arabia

²Community and Mental Health Nursing Department, Faculty of Nursing, Al al-Bayt University P.O. Box 130040, Mafraq, Jordan

³Community and Mental Health Nursing Department, Zarqa University, Zarqa, Jordan

⁴Nursing Professional Development Department, Dammam Medical Complex, Dammam, Saudi Arabia

Correspondence should be addressed to Tamadur Shudayfat; t.shdaifat@aabu.edu.jo

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Objective: To explore the influence of demographic factors and flourishing on workplace distractions in a cross-country analysis of Saudi Arabia and Jordan.

Methods: This cross-sectional comparative study was conducted in two government hospitals: one in eastern Saudi Arabia and the other in northern Jordan. Data were collected from the nurses using convenience sampling. The required sample size was determined using the G*Power software, with a target of 242 nurses per country, resulting in 484 participants. Ultimately, the final sample consisted of 437 nurses: 222 from Saudi Arabia and 215 from Jordan. Two online instruments were used to collect data on the distractions and flourishing.

Results: The study found that “using the Internet” and “using the phone” were the most time-consuming distractions among nurses, while “watching TV” was the least time-consuming. There were significant associations between demographics and distractions, with participants from Saudi Arabia having lower distraction scores than participants from Jordan. Younger participants were more distracted than older participants, whereas male participants were more distracted than female participants were. Smokers and individuals with less expertise exhibit higher levels of distraction. Furthermore, degree of education was associated with higher levels of distraction. Nurses in Saudi Arabia experience a much greater loss of productivity due to distractions than their Jordanian counterparts. Regression analysis revealed that experience, “Mental and Physical Health” domain scores, smoking status, and educational level all highly predicted distraction levels among Saudi Arabian and Jordanian nurses, accounting for approximately 9.6% of the differences in distraction.

Conclusion: In this cross-country study on workplace distractions among Saudi and Jordanian nurses, “using the Internet” and “using the phone” emerged as the most time-consuming distractions. Younger age, male sex, smoking, and less experience are associated with higher distraction levels. Additionally, higher education levels were linked to increased distraction. Implementing employee flourishing activities can help reduce distractions and enhance productivity. This study offers valuable insights into improving nurses’ performance and well-being.

Keywords: cross-country analysis; flourishing; Jordan; nurses; Saudi Arabia; workplace distractions

1. Introduction

Distraction is a constant challenge in fast-paced modern work environments that interferes with activities and leads to consequences, such as medical errors, conflicts, delays in treatment, and reduced healthcare productivity [1–4]. Distractions take someone's focus away from their current task [5]. Nurses must pay attention while managing a variety of tasks in a fast-paced atmosphere in order to provide high-quality care. Every action can have a different result and disastrous effects. Therefore, distractions have been extensively researched in the healthcare field [6]. Complex skills are needed to handle these disruptions because distractions can lead to nurses losing focus, which raises the possibility of patient safety problems [7, 8]. According to Sørensen and Brahe [9], nurses are frequently questioned about their work and are asked for patient information. Other healthcare professionals, nursing staff, phones, patients, family members, visitors, and self-interruptions are primary causes of distraction [9, 10]. Westbrook et al. observed 98 nurses who prepared and administered 4,271 drugs to 720 patients in an Australian hospital. According to study findings, a nurse's probability of making a medication error increased by 12.7% for every interruption, and this risk tripled when a nurse was interrupted six times [4]. According to a study by Hall et al. [11], which examined 13,025 distractions encountered by medical and surgical nurses in 36 units from nine hospitals, 90% of distraction-related errors led to treatment delays or a loss of attention or concentration. These mistakes occur frequently during paperwork, medical administration, procedures, or assessments related to patient care.

Flourishing, encompassing well-being and efficient work, plays a crucial role in employee satisfaction. It represents a state of positive health, characterized by high levels of emotional, psychological, and social well-being [12]. It encompasses happiness, resilience, commitment, and determination and contributes to overall well-being. Positive health behaviors and outcomes [13], job satisfaction [14], and optimal biomarkers of inflammation [15] have all been linked to flourishing in previous research. A recent study involving resident physicians found that flourishing was positively correlated with resilience and coping and negatively correlated with emotional exhaustion and negative affect [16]. Flourishing can help nurses overcome adversity, such as hospitalized patients who are incurable, by giving them confidence to act quickly to preserve patients' lives, hope that every patient will recover, and great optimism for patient healing [17].

Successful employees experience fewer difficulties at work, enjoy autonomy, receive better rewards, and receive more support than their less successful colleagues [18]. The work environment also influences well-being, with stimulating work promoting well-being and uninteresting environments having a negative impact on overall flourishing [19].

Interruptions that require attention, such as phone calls, differ from distractions and irrelevant inputs, which must be ignored [20–22]. An average of 86 interruptions per day

affect concentration and productivity [23]. Despite the importance of well-being, few studies have examined its relationship with distraction [24]. Internal (malaise and fatigue) and external (personal contact, emails, and calls) factors contribute to distractions and cause errors, accidents, poor work quality, stress, anger, emotional fatigue, and reduced job satisfaction and engagement [25].

Healthcare facilities, which are particularly prone to distractions, have recently received attention due to potential errors and lack of focus on important tasks [7, 8, 20]. Although previous research has examined the types of distractions, few studies have focused on nursing staff distraction costs and related variables. This study fills this gap by comparing distraction costs among Saudi Arabian and Jordanian nurses, identifying the causes, examining work-related factors, and examining the role of flourishing in reducing productivity. Demographic impacts were also examined to provide cross-national insights into improving employee well-being and healthcare efficiency. In this study, we aimed to expand the existing knowledge base in this field by examining the causes, effects, and potential mitigating variables of nursing distractions. It seeks to provide useful information that can direct practice and policy, ultimately enhancing staff well-being and patient care.

2. Methods

2.1. Site, Setting, and Design. This comparative cross-sectional study was conducted in the eastern region of Saudi Arabia and northern Jordan, specifically focusing on government hospitals that fall under the Ministry of Health (MOH). The data for this study were gathered from nurses working in various units in these hospitals. The study was conducted in a government hospital located in the Eastern Province of Saudi Arabia. This region is renowned for its diverse population and rapid urbanization, resulting in a mix of urban and rural healthcare settings. In Jordan, the data were collected from a government hospital in the northern region, which predominantly serves rural and semiurban populations. This provides valuable insights into healthcare delivery in less urbanized settings. These locations were chosen to encompass a wide range of sociodemographic characteristics and healthcare environments, thereby enhancing the generalizability of the study's findings. An age dichotomy of 40 years was chosen based on the available literature, which indicates that age 40 is a significant milestone in the careers and lifestyles of nurses. This cutoff aids in distinguishing between younger and older participants in terms of their workplace experiences and vulnerability to distractions. Experience in this study pertains to the duration that nurses have devoted to their profession, which is being considered to assess its influence on workplace distractions and productivity. BMI data were collected to explore their correlation with workplace distractions, as prior research has revealed that physical health can affect cognitive function and productivity, thus establishing BMI as a pertinent variable.

2.2. Sampling and Sample Size and Calculation. The population sample consisted of nurses, and a convenience sample was used. Nurses working in government hospitals in both countries were invited to participate in the study. This study primarily focused on governmental hospitals that fall under the purview of the MOH as they exemplify the wider healthcare system and abide by regulatory standards imposed by the MOH. The required sample size was calculated using the G*Power software, resulting in 242 nurses estimated for each country, assuming an effect size of 0.3 and alpha equal to 0.05. An additional 20% was added to account for potential nonresponse. In total, 484 nurses were recruited to ensure adequate response rates.

2.3. Instruments. Two instruments were used in the study. The first instrument focuses on distractions, gathering data on the frequency and duration of various types of distractions to discern patterns [26]. Participants reported how often they had engaged in each type of distraction in the previous week and how much time it took them to complete each distraction. The total duration for each participant was calculated by multiplying the distraction time with the frequency of each week. The participants were surveyed regarding the distractions they encountered in their workplace using a comprehensive questionnaire. For instance, one of the questions inquired, "How frequently did you experience distractions during the working day, and for how long did these distractions persist?" Participants provided specific information pertaining to the frequency and duration of distractions across a range of activities such as conversing with colleagues, utilizing the phone and Internet, scheduling personal appointments, engaging in online shopping, making bill payments, receiving visits from family or friends, taking breaks for snacks or smoking, organizing clutter, participating in gossip, extending lunch breaks, and attending meetings.

The second instrument is the Flourishing Index. There are 12 elements in each of the six domains: Happiness and Life Satisfaction, Mental and Physical Health, Meaning and Purpose, Character and Virtue, Close Social Relationships, and Financial and Material Stability. Each point was scored on an 11-point scale ranging from 0.0 to 10.0. The scores for each of the first six domains were added, with the extreme categories flagged and aligned to higher scores indicating more positive responses. High scores indicated that people had strong opinions about themselves when it came to human flourishing. The questionnaire covered various domains of well-being, with the participants rating their experiences on an 11-point scale. For instance, participants were instructed to assess their overall life satisfaction by envisioning a ladder with steps ranging from 0 at the bottom to 10 at the top, representing the best and worst possible life scenarios, respectively. The participants were also asked to evaluate their general level of happiness using the same scale. In addition, participants were asked about their perceptions of their physical health, with responses ranging from 0 to 10 [27, 28]. The survey was conducted using the online survey platform, QuestionPro (<https://www.questionpro.com>).

QuestionPro was chosen because of its user-friendly interface, secure data-handling capabilities, and proficiency in managing large-scale surveys across various geographical regions. This platform enabled us to effectively engage a broad range of nurses in Saudi Arabia and Jordan, thereby ensuring a rigorous and uniform data collection process. Furthermore, QuestionPro's functionalities, including real-time data analytics and customizable survey templates, have facilitated extensive data management and analysis. The survey was conducted in Arabic.

2.4. Pilot Study. Two key pilot studies were conducted to assess the questionnaire's construct validity in different settings. In a Jordan pilot study involving 40 nurses, Pearson's correlation analysis identified questions as valid if their R value exceeded 0.3120, as determined by the critical score table. Improvements in the participants' clarity were made through careful adjustments to two negligible points. The internal consistency assessment conducted using Cronbach's alpha analysis highlighted robust coherence, with an r value between 0.411 and 0.785 and a commendable Cronbach's alpha coefficient of 0.825. Likewise, the Saudi pilot study involving 27 nurses relied on Pearson correlation analysis for item construct validity. Questions were considered valid if their R value exceeded 0.381, based on the cutoff value of the correlation analysis table. The results were both meaningful and valid and were confirmed by reliable Cronbach's alpha analysis, with r values ranging from 0.524 to 0.866, yielding a remarkable Cronbach's alpha coefficient of 0.9224 [29]. Both pilot studies confirmed the questionnaire's construct validity and provided valuable insights into its clarity and cultural appropriateness. Minor adjustments were made based on participant feedback and quantitative analysis to improve clarity and relevance. The measures of distraction used in this study were specifically developed to address the gaps identified in the literature, and the detailed rationale for their development and psychometric testing procedures is included in the revised manuscript. These refinements ensured that the questionnaire is robust and culturally relevant to the main study.

2.5. Ethical Consideration. The study protocol was approved by the Institutional Review Board of Imam Abdulrahman Bin Faisal University in Saudi Arabia (IRB-2022-04-275) and Al al-Bayt University in Jordan (Protocol no. 10/2021/2022). The participants were informed about the purpose, significance, and benefits of the study and provided with an information sheet. The participants emphasized that their involvement was voluntary and that there would be no physical or mental harm incurred from the study. Informed consent was obtained from all the participants. The collected data were treated as confidential, and the research team was solely responsible for its management.

2.6. Cost Analysis. The cost analysis conducted in this study aimed to examine lost productivity, which was measured by calculating the average minutes lost per week per nurse for

each distractor. Two measures, the mean and interquartile range (IQR), were used to represent the distribution of lost minutes. The mean provided an average estimate of the time lost, while the IQR captured the central spread of the data, offering a robust measure of the central tendency that was less affected by outliers. The lost minutes per nurse were then multiplied by the pay per minute for each nurse in both countries, resulting in monetary loss. By quantifying the time spent on distractors, the calculation of productivity loss allows for the direct conversion of time loss into monetary amounts. This approach provides a practical perspective on the economic impacts of distractors. To evaluate the cost implications of workplace distractions, economic calculations incorporated the reported time allocated to distractions and the average wage rates for nurses in each country. The economic impact was determined by estimating the monetary value of productivity loss.

2.7. Data Analysis. Data were stored and analyzed using SPSS version 22. Microsoft Excel was used to calculate the cost of the lost productivity. Continuous data are presented as means and standard deviations, while categorical variables are presented as frequencies and percentages. The internal consistency of the scales used in this study was tested using reliability analysis, and Cronbach's alpha coefficients were calculated. Independent *t*-tests and ANOVA were used to determine differences between groups. Pearson's correlation coefficients were used to assess the relationships between variables. Multiple linear regression was used to predict the cost of the distractions. Statistical significance was set at *p* of less than 0.05.

2.8. Validity and Reliability. The study had a total response rate of 53.1% in both countries. Of the initial sample of 484 invited participants (242 from each country), 437 nurses completed the surveys. Specifically, 222 nurses from Saudi Arabia and 215 from Jordan participated in this study. Nineteen participants were excluded from the analysis due to missing data, with one participant from Saudi Arabia and 18 from Jordan being affected. Additionally, 18 participants were excluded owing to a lack of variance, and eight participants with more than 20% missing data were removed to prevent bias. Imputation filled the gaps for variables with values less than 20%. The alpha value (0.678–0.918) confirmed the internal consistency of the scale. Three outliers were identified using Mahalanobis distances, eliminated at the 5% significance level, and influence integrity was preserved. After these steps, the final sample size for the analysis was 437 participants to increase the reliability. Transformations ensured the normality of the dependent variables. Validation of the distraction and flourishing scales using Pearson's correlation showed significant relationships ($p < 0.001$), confirming the robustness and reliability of the study in subsequent statistical analyses.

3. Results

The study had an overall response rate of 53.1%, with 437 participants completing the survey. Of these, 222 were from

Saudi Arabia and 215 were from Jordan. The majority of the participants were 40 years old (80.8%), female (79.2%), and nonintensive care professionals (73.2%) and had 20 years of experience (87.4%). The proportion of nonsmokers was 79.4%, 70.3% were married, 43.7% had a diploma, and 47.1% had a BSc degree. The BMI distribution was 2.1% underweight, 36.6% normal weight, 38.7% overweight, and 22.7% obese. These demographic data provided valuable insights into the composition of the participants and improved our understanding of the study results (Table 1).

3.1. Cronbach's Alpha. Cronbach's alpha coefficient of the flourishing scale was 0.896, indicating a high level of internal consistency. A total of 437 participants were included in this study, with 50.8% from Saudi Arabia and 49.2% from Jordan.

Table 2 shows the data on various distractions and weekly time lost by nurses. The highest average minutes lost occurred when using the Internet (mean = 62.9), followed by telephone (mean = 50.6), and the least when watching television (mean = 9.5). The total distraction category showed that nurses lost an average of 378.9 min to distractions, with a median of 194.0 min.

Table 3 highlights the notable differences in distraction levels between participants from Saudi Arabia and Jordan in the different categories. Participants from Saudi Arabia reported lower total distractions (mean = 308.6) than those from Jordan (mean = 455.2), indicating a significant disparity in the total distracted experiences ($p = 0.014$). In particular, there was a significant difference in the occurrence of smoking/snacking breaks between the two groups. Participants from Saudi Arabia (mean = 14.1) reported significantly fewer distractions in this category than did participants from Jordan (mean = 33.9, $p = 0.001$). These results suggest that people from Saudi Arabia generally experience fewer distractions and take fewer smoke/snack breaks than their Jordanian counterparts.

The lost productivity of all nurses in Saudi Arabia due to all types of distractions was estimated at 308.6 min per week. This equates to a monetary loss of 84.22947 USD per week, considering a payment rate of 0.2223 USD per minute. Likewise, the lost productivity for all nurses in Jordan due to all types of distractions was calculated at 455.2 min per week. This equates to a monetary loss of 40.33072 USD per week with a payment rate of 0.0886 USD per minute.

Table 4 shows the demographic influences of the distractions. Participants from Saudi Arabia had a lower average distraction score (308.6) than their Jordanian counterparts (455.2) ($p = 0.014$). Age under 40 years correlated with a higher mean distraction score (444.6) than age over 40 years (113.8) ($p = 0.001$). Men had a higher average distraction score (523.3) than women (343.4) ($p = 0.015$). Experience under 20 years was associated with a higher mean distraction score (426.9) than experience over 20 years (62.1) ($p = 0.001$). Smoking status influenced distractions: Nonsmokers scored 342.4, while smokers had a higher average score of 529.0 ($p = 0.012$). Differences in educational levels were evident; those with a diploma scored 277.9

TABLE 1: Demographic characteristics of participants.

Variable	Category	Frequency	Percent
Residency	Saudi	222	50.8
	Jordan	215	49.2
Age	≤ 40	353	80.8
	> 40	84	19.2
Gender	Male	91	20.8
	Female	346	79.2
Specialty	Critical	117	26.8
	Noncritical	320	73.2
Experience	≤ 20	382	87.4
	> 20	55	12.6
Smoking	No	347	79.4
	Yes	90	20.6
Marital status	Single	104	23.8
	Married	307	70.3
	Divorce or widowed	26	5.9
Educational level	Diploma	191	43.7
	BSc	206	47.1
	MSN or PhD	40	9.2
BMI	Underweight	9	2.1
	Normal	160	36.6
	Overweight	169	38.7
	Obesity	99	22.7

TABLE 2: Type of distraction and minutes loss per week among nurses.

Type of distraction	Mean (SD)	Median (IQR)	Minimum	Maximum
Use the Internet	62.9 (155.7)	15.0 (44.5)	0	961
Use the phone	50.6 (131.3)	12.0 (32.0)	0	961
Discussions with coworkers, patients, or work acquaintances	31.4 (84.7)	12.0 (26.0)	0	961
Meeting	25.7 (82.6)	4.0 (21.0)	0	961
Clutter	25.0 (89.5)	2.0 (15.0)	0	961
Smoke and snack breaks	23.8 (61.1)	6.0 (24.5)	0	961
Gossip	22.5 (100.7)	1.0 (11.0)	0	961
Organizing and planning for personal time	20.6 (37.2)	9.0 (21.0)	0	341
Daydream	19.6 (79.7)	1.0 (9.5)	0	930
Taking too long of a lunch with colleagues	18.9 (57.6)	2.0 (21.0)	0	961
Pay personal bills	17.8 (79.7)	2.0 (8.0)	0	961
Shop from work by catalog, phone, or Internet	16.3 (55.0)	1.0 (11.0)	0	961
Play computer games	12.9 (74.1)	1.0 (3.0)	0	961
Leisure reading (e.g., books and magazines)	10.8 (50.0)	1.0 (5.0)	0	961
Visits at work from family, friends, or others	10.4 (24.2)	1.0 (7.5)	0	248
Watch TV	9.5 (25.8)	1.0 (4.0)	0	248
Total distractions	378.9 (638.0)	194.0 (324.5)	0	6315

points, BSc holders scored 436.6, and MSN or PhD holders scored the highest at 586.9. There was a significant difference in the distraction scores between graduates and college graduates ($p = 0.004$).

The analysis found that age was a significant factor affecting flourishing scores, with those aged 40 years and younger having lower average scores in the areas of Happiness and Life Satisfaction, Mental and Physical Health, and Meaning and Purpose ($p = 0.023$, $p = 0.024$, and $p = 0.022$). Conversely, those over 40 years of age tended to have a higher level of prosperity. Gender-specific scores in the Mental and Physical Health domains ($p = 0.012$) indicated sex differences in flourishing. Experience also played a role;

participants over 20 years of age showed higher scores in all areas ($p = 0.002$, $p = 0.018$, $p = 0.028$, and $p = 0.001$), indicating increased flourishing with greater experience. However, education level, smoking habits, marital status, type of specialty, and body mass index did not show any significant influence on the level of success. No significant differences were observed between graduate and college graduates, smokers and nonsmokers, marital status, discipline, or body mass index categories, implying limited or negligible effects on overall flourishing behavior (Table 5).

Table 6 shows the correlations between the amount of distraction in minutes per week and different domains of flourishing. These correlations provide insight into the

TABLE 3: The difference in distraction between Saudi and Jordan.

Distraction/country	Saudi Mean (SD)	Jordan Mean (SD)	95% CI	Sig
Discussions with coworkers, patients, or work acquaintances	37.9 (115.2)	24.6 (29.1)	(-2.4, 29.0)	0.096
Use the phone	49.9 (140.1)	51.3 (122.0)	(-26.1, 23.4)	0.916
Use the Internet	74.8 (191.8)	50.6 (105.5)	(-4.8, 53.2)	0.102
Organizing and planning for personal time	20.1 (40.7)	21.0 (33.4)	(-7.9, 6.1)	0.803
Shop from work by catalog, phone, or Internet	18.0 (68.9)	14.5 (35.4)	(-6.8, 13.9)	0.504
Pay personal bills	19.9 (73.2)	15.8 (86.1)	(-11.0, 19.1)	0.601
Visits at work from family, friends, or others	8.2 (17.5)	12.6 (29.5)	(-8.9, 0.2)	0.061
Daydream	20.4 (95.4)	18.7 (59.5)	(-13.3, 16.7)	0.828
Leisure reading (e.g., books and magazines)	13.6 (67.9)	7.8 (18.3)	(-3.6, 15.0)	0.226
Play computer games	15.5 (91.7)	10.4 (50.0)	(-8.9, 19.0)	0.478
Watch TV	9.9 (25.0)	9.1 (26.8)	(-4.1, 5.7)	0.746
Smoke & snack breaks	14.1 (24.7)	33.9 (82.4)	(-31.4, -8.3)	0.001
Clutter	25.3 (99.5)	24.7 (78.1)	(-16.2, 17.5)	0.938
Gossip	16.1 (91.9)	29.3 (108.9)	(-32.1, 5.8)	0.173
Taking too long of a lunch with colleagues	15.3 (67.1)	22.7 (45.9)	(-18.2, 3.5)	0.183
Meeting	24.0 (76.6)	27.4 (88.5)	(-19.0, 12.1)	0.667
Total distractions	308.6 (648.7)	455.2 (593.8)	(-263.7, -29.4)	0.014

TABLE 4: Demographic characteristics difference related to distraction.

Variable	Category	Mean (SD)	95% CI	Sig
Residency	Saudi	308.6 (648.7)	(-263.7, -29.4)	0.014
	Jordan	455.2 (593.8)		
Age	≤ 40	444.6 (594.1)	(184.6, 477.1)	0.001
	> 40	113.8 (686.1)		
Gender	Male	523.3 (575.8)	(35.8, 324.1)	0.015
	Female	343.4 (633.8)		
Specialty	Critical	467.7 (645.2)	(-14.8, 251.2)	0.081
	Noncritical	349.5 (616.7)		
Experience	≤ 20	426.9 (609.8)	(190.6, 539.1)	0.001
	> 20	62.1 (647.9)		
Smoking	No	342.4 (634.4)	(-331.3, -42.0)	0.012
	Yes	529.0 (571.4)		
Marital status	Single	508.7 (578.9)	(395.6, 621.9)	0.056
	Married	344.8 (633.3)	(273.7, 415.9)	
	Divorce or widowed	301.1 (669.9)	(30.5, 571.7)	
Educational level	Diploma	277.9 (639.3)	(186.7, 369.2)	0.004 ^a
	BSc	436.6 (610.5)	(352.6, 520.7)	
	MSN or PhD	586.9 (562.0)	(407.2, 766.7)	
BMI	Underweight	289.8 (209.1)	(129.1, 450.6)	0.542
	Normal	423.1 (614.9)	(326.8, 519.4)	
	Overweight	386.9 (599.8)	(295.8, 478.0)	
	Obesity	311.2 (706.9)	(170.2, 452.2)	

^aTukey HSD: diploma versus BSc ($p = 0.030$); diploma versus MSN or PhD ($p = 0.012$).

strength and direction of the relationships between these variables. These results suggest a moderately negative association between distraction and several flourishing domains. In particular, higher levels of distraction correlated significantly with lower levels of flourishing in the Happiness and Life Satisfaction domains ($r = -0.172$, $p = 0.001$), Mental and Physical Health domains ($r = -0.202$, $p = 0.001$), and Close Social Relationships domains ($r = -0.142$, $p = 0.003$). However, the correlations between distraction and the Meaning and Purpose ($p = 0.112$), Character and

Virtue ($p = -0.456$), and the Financial and Material Stability ($p = -0.313$) domains were not statistically significant.

The model summary showed that approximately 9.6% of the distraction variation was explained by predictors, accounting for approximately 10.4% of the differences. The Durbin-Watson statistic (1.858) suggests no systematic errors in the predictions. The ANOVA table shows the statistical significance of the model ($F = 12.537$, $p < 0.001$), indicating that the predictors collectively influenced distraction. Stepwise regression identified significant predictors

TABLE 5: Demographic characteristics difference related to flourishing.

Variable	Category	Happiness and Life Satisfaction		Mental and Physical Health		Meaning and Purpose		Character and Virtue		Close Social Relationship		Financial and Material Stability	
		Mean (SD)	Sig	Mean (SD)	Sig	Mean (SD)	Sig	Mean (SD)	Sig	Mean (SD)	Sig	Mean (SD)	Sig
Residency	Saudi	12.9 (4.6)		13.9 (4.4)	0.370	15.5 (3.9)	0.657	15.7 (3.5)	0.772	15.0 (4.3)	0.051	11.9 (5.3)	0.520
	Jordan	12.3 (4.2)	0.121	14.3 (3.6)		15.4 (3.3)		15.8 (3.2)		14.2 (4.0)		11.6 (4.7)	
Age	≤ 40	12.4 (4.3)	0.023	13.9 (4.1)	0.024	15.3 (3.7)	0.022	15.7 (3.3)	0.361	14.2 (4.2)	0.001	11.7 (4.9)	0.290
	> 40	13.6 (4.7)		15.0 (3.7)		16.3 (3.3)		16.1 (3.6)		16.1 (3.8)		12.5 (5.5)	
Gender	Male	12.8 (4.5)	0.630	14.9 (3.3)	0.012	16.0 (2.9)	0.077	16.3 (2.8)	0.051	14.8 (3.7)	0.601	11.9 (5.0)	0.736
	Female	12.6 (4.4)		13.9 (4.2)		15.3 (3.8)		15.6 (3.5)		14.5 (4.3)		11.7 (5.0)	
Specialty	Critical	12.7 (4.2)	0.835	14.1 (3.8)	0.938	15.2 (3.9)	0.371	15.6 (3.2)	0.625	14.7 (3.7)	0.705	11.7 (4.8)	0.885
	Noncritical	12.6 (4.5)		14.1 (4.1)		15.5 (3.5)		15.8 (3.4)		15.8 (3.4)		14.5 (4.3)	
Experience	≤ 20	12.4 (4.3)	0.002	13.9 (4.1)	0.018	15.3 (3.7)	0.028	15.8 (3.3)	0.637	14.3 (4.1)	0.001	11.7 (5.0)	0.225
	> 20	14.4 (5.0)		15.3 (3.7)		16.5 (3.3)		16.0 (3.7)		16.3 (3.9)		12.5 (5.5)	
Smoking	No	12.8 (4.4)	0.140	14.1 (4.0)	0.648	15.5 (3.6)	0.918	15.7 (3.4)	0.426	14.7 (4.1)	0.246	11.9 (4.9)	0.387
	Yes	12.0 (4.5)		13.9 (4.1)		15.4 (3.8)		16.0 (3.3)		14.1 (4.3)		11.4 (5.3)	
Marital status	Single	12.7 (4.3)	0.871	14.3 (4.1)	0.659	15.5 (3.7)	0.681	16.1 (3.1)	0.416	14.7 (3.8)	0.678	12.3 (4.3)	0.260
	Married	12.7 (4.4)		14.1 (3.9)		15.5 (3.7)		15.6 (3.6)		15.2 (4.3)		11.9 (5.2)	
Educational level	Diploma	12.6 (4.8)		13.9 (4.4)		15.5 (3.8)		15.9 (3.5)		14.7 (4.5)		11.7 (5.5)	
	BSc	12.6 (4.2)	0.844	14.2 (3.8)	0.658	15.3 (3.6)	0.649	15.7 (3.4)	0.727	14.4 (3.9)	0.743	11.7 (4.6)	0.515
	MSN or PhD	13.0 (3.9)		14.5 (3.7)		15.9 (3.1)		16.1 (3.0)		14.5 (3.9)		12.7 (4.5)	
BMI	Underweight	12.4 (4.6)		15.1 (6.3)		14.6 (3.2)		14.8 (3.0)		15.1 (3.9)		12.3 (6.5)	
	Normal	12.6 (4.3)	0.657	14.1 (4.0)	0.606	15.6 (3.7)	0.793	16.1 (3.2)	0.527	14.7 (3.9)	0.423	12.1 (4.8)	0.676
	Overweight	12.4 (4.5)		13.8 (4.0)		15.3 (3.7)		15.6 (3.4)		14.2 (4.2)		11.5 (5.1)	
	Obesity	13.1 (4.5)		14.4 (4.0)		15.5 (3.5)		15.7 (3.6)		15.0 (4.5)		11.6 (5.2)	

TABLE 6: The correlation between distraction (minutes per week) and flourishing domains.

Distraction/domains	Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Domain 6
<i>r</i>	-0.172	-0.202	-0.076	-0.036	-0.142	-0.048
Sig	-0.001	-0.001	-0.112	-0.456	-0.003	-0.313

Note: Domain 1: Happiness and Life satisfaction, Domain 2: Mental and Physical Health, Domain 3: Meaning and Purpose, Domain 4: Character and Virtue, Domain 5: Close Social Relationship, and Domain 6: Financial and Material Stability.

including experience (negative association, $p = 0.001$), mental and physical health (inverse association, $p = 0.001$), smoking (positive association, $p = 0.020$), and educational level (higher levels associated with distraction, $p = 0.025$). In summary, experience, mental/physical health, smoking, and education predicted distraction, with more experienced, healthier, and better-educated participants as well as smokers exhibiting varying levels of distraction (Table 7).

4. Discussion

This study aimed to explore the impact of demographic factors and flourishing on workplace distraction among nurses in Saudi Arabia and Jordan. The results demonstrated that “using the Internet” and “using the phone” were the most time-consuming distractions, consistent with previous research that has identified these as common sources of interruption in healthcare settings [7, 30]. The extensive utilization of technology in contemporary healthcare, although crucial for communication and information management, also poses significant challenges. These distractions have the potential to disrupt the workflow, diminish efficiency, and compromise patient safety by diverting attention away from critical tasks.

The demographic analysis revealed that younger, male, and less experienced nurses, as well as those who smoked, reported higher levels of distraction. These findings are consistent with previous studies that indicate that younger and less experienced nurses may be more susceptible to distractions due to a lack of developed coping strategies and greater reliance on technology for both work-related and personal tasks [7]. The increased levels of distraction among male nurses may be attributed to varying stress responses or social factors that influence their interactions with technology. Smoking, often used as a coping mechanism for stress, appears to be associated with higher levels of distraction, suggesting that nurses may be more inclined to take breaks or divert their attention during work hours.

An association between educational level and distraction was observed, with nurses with higher education levels reporting a greater incidence of distraction. This correlation can be attributed to the heightened cognitive demands placed on nurses with advanced education, who frequently undertake additional responsibilities necessitating multi-tasking, thereby augmenting their vulnerability to potential distractions. These findings highlight the intricate nature of the nursing work milieu, wherein personal attributes and professional obligations interact to shape the degree of distraction experienced.

The cross-country comparison conducted in this study revealed that despite reporting fewer distractions overall,

Saudi nurses encountered a more significant decrease in productivity than their Jordanian counterparts. This finding, which seems contradictory, implies that, although Saudi nurses may be more skilled in limiting the number of distractions, the distractions they encounter may have a more profound influence on their workflow. This outcome can potentially be ascribed to cultural or systemic factors within the Saudi healthcare system that exacerbate the effects of distractions such as increased workloads or more stringent performance expectations. Conversely, Jordanian nurses may employ more effective strategies to manage distractions, resulting in lower perceived impact on productivity.

The finding regarding the substantial influence of flourishing, specifically on both mental and physical well-being, in predicting distraction levels is essential. Nurses who exhibit better health reports experience fewer distractions, emphasizing the crucial role of well-being in sustaining concentration and productivity. This observation is in line with previous research which indicates that fostering mental and physical health within the workplace can heighten employee performance and decrease the occurrence of errors [31, 32]. Consequently, initiatives designed to promote flourishing, such as stress management programs, mindfulness training, and activities promoting physical wellness, hold significant potential for mitigating the detrimental effects of distractions and ultimately enhancing overall nurse performance.

These findings have important implications for patient safety. It is well established that distractions in healthcare settings increase the risk of errors, which can ultimately lead to grave consequences for patient outcomes [4]. Through the identification of pivotal predictors of distraction, this study offers valuable insights into the development of targeted interventions with the objective of minimizing distractions. For instance, training programs that bolster coping skills among younger and less experienced nurses, as well as initiatives that foster healthy lifestyles and stress management, hold promise in this regard.

The cultural disparities observed between Saudi and Jordanian nurses underscore the need to employ context-specific methodologies to effectively address workplace distractions. Interventions should be customized to account for the distinctive cultural and systemic elements that shape nursing practices in each country. For instance, strategies that demonstrate efficacy in Jordan may require adaptation to align with the distinct work environments prevalent in Saudi Arabia.

In conclusion, this study contributes to academic knowledge on the correlation between demographic factors, flourishing, and workplace distractions in the nursing work

TABLE 7: Regression analysis results for predicting distraction.

Predictor	B	SE	β	Sig	R ²	F	Adj R ²
Intercept	927.734	111.356	—	0.001	0.104	12.537	0.096
Experience	-16.299	3.766	-0.198	0.001			
Mental and Physical Health domain	-29.009	7.090	-0.187	0.001			
Smoking (ref: no)							
Yes	165.111	70.547	0.107	0.020			
Educational level (ref: diploma)							
MSN or PhD	222.144	98.941	0.103	0.025			

environment. The findings indicate that mitigating distractions has the potential not only to enhance the well-being and performance of nurses but also to promote patient safety. Further research should focus on studying the long-term effects of these distractions and evaluating the efficacy of different intervention strategies across various healthcare settings. By addressing these challenges, healthcare systems can provide better support to nursing staff, ultimately resulting in improved quality of care and patient outcomes.

This study had several limitations. The study's use of a specific hospital sample in Saudi Arabia and Jordan restricts the generalizability of the findings to other regions or healthcare settings. Convenience sampling may introduce selection bias, as participants may not adequately represent the broader nursing population. The reliance on self-reported data introduces a response bias, which may result in inaccuracies due to social desirability or recall issues. Additionally, the cross-sectional design does not allow for causal inferences, capturing only a single point in time and limiting the establishment of temporal relationships. By focusing solely on nurses, the applicability of the results to other healthcare professionals or industries is limited.

The assumptions made in an economic analysis of productivity loss may oversimplify the complex factors that influence workplace efficiency, potentially distorting impact estimates. Furthermore, the exclusion criteria and removal of outliers, although necessary, may have introduced bias by excluding data that may have influenced the results. Finally, the instruments used, while validated, may not fully capture the cultural nuances or specific workplace challenges faced by nurses in different countries. Despite these limitations, this study offers valuable insights into workplace distractions among nurses, thus informing future research.

5. Nursing Implications

Understanding the factors that hinder the influence of demographic factors and flourishing on workplace distractions among nurses in Jordan and Saudi Arabia will assist policymakers in both countries, governments, NGOs, and other stakeholders in creating targeted policies and programs. These initiatives will prepare an appropriate work environment and help reduce sources of workplace distractions. Healthcare organizations should manage their cell phone usage to minimize distractions by establishing effective and practical usage policies. Additionally, we recommend

orientation programs for novice nurses that tailor behaviors to reduce workplace distractions, including smoking and frequent cell phone use. In addition, we recommend the implementation of policies that restrict cell phone use in clinical settings.

6. Conclusions

This study sheds light on the critical impact of nurse distractions on well-being, including happiness, mental and physical health, and social relationships. Factors such as age, sex, experience, smoking, and education have a significant influence on these distractions. Our findings underscore the economic ramifications of nurse distraction in Saudi Arabia and Jordan. Regression analysis identified experience, health status, smoking, and education as the key predictors of distraction levels. Despite limitations, such as convenience sampling and potential self-report bias, our results provide valuable insights into the adverse effects of nurse distractions and their economic implications. This study emphasizes the necessity for targeted interventions and policies to mitigate distractions and enhance nurses' well-being. Future research should investigate the longitudinal effects of these distractions and assess the effectiveness of specific interventions in diverse healthcare settings.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

E.S.: conceptualization, T.S.: data management, E.S.: methodology, and N.A., M.A., and N.A.: preparation of the first draft of the main manuscript. All authors have reviewed the final copy of the manuscript.

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Research Article

Exploring the Relationship Between Ethical Leadership and Nurses' Moral Courage in China: The Mediating Effect of Psychological Empowerment

Xuan Wang ¹, Lijuan Zhou ¹, Xianxiu Wen ^{1,2} and Li Gou ²

¹Department of Nursing, Sichuan Provincial People's Hospital, University of Electronic Science and Technology of China, Chengdu, China

²Department of Nursing Research Centre, Sichuan Provincial People's Hospital, University of Electronic Science and Technology of China, Chengdu, China

Correspondence should be addressed to Xianxiu Wen; wxxjyc@163.com and Li Gou; gouli_sunny@163.com

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Aim: To empirically investigate the impact of ethical leadership on nurses' moral courage in China and examine the mediating role of psychological empowerment in this relationship.

Background: Moral courage is essential for alleviating nurses' moral distress, safeguarding patients' safety and rights, and providing high-quality care. Previous studies have emphasized the strong relationship between ethical leadership and moral courage; however, little is known about the actual impact of ethical leadership on nurses' moral courage. This study introduces psychological empowerment, sets out to test empirically its role in the relationship between ethical leadership and moral courage, and provides countermeasures and a theoretical basis for cultivating nurses' moral courage.

Methods: Between February and May 2023, a questionnaire survey was conducted among 837 nurses from five hospitals in Sichuan Province, southwest China. The three validated self-report scales, the ethical leadership scale, psychological empowerment scale, and nurses' moral courage scale, were used to collect data. We used IBM SPSS 27.0 for descriptive statistics, univariate analyses, Cronbach's α , and correlations of each variable, modeling a hypothesized model of ethical leadership on moral courage in nurses and testing the internal mechanisms by AMOS 26.0.

Results: Ethical leadership significantly positively correlated with psychological empowerment ($r=0.374$, $p < 0.01$), as well as moral courage ($r=0.341$, $p < 0.01$). In addition, psychological empowerment significantly positively correlated with moral courage ($r=0.518$, $p < 0.01$). The structural equation modeling (SEM) shows a satisfactory model fit: $\chi^2 = 2156.36$, $df = 849$, $\chi^2/df = 2.540$, root mean square of approximation = 0.043, standard root mean square residual = 0.047, normed fit index = 0.911, Tucker–Lewis index = 0.941, and comparative fit index = 0.944. Ethical leadership directly influenced moral courage ($\beta = 0.135$, $p = 0.006$) and indirectly affected moral courage via psychological empowerment ($\beta = 0.247$, $p = 0.001$).

Conclusion: Promoting ethical leadership and psychological empowerment is essential for nurses to promote moral courage. The results of this study illustrate the pivotal role of psychological empowerment in establishing the impact of ethical leadership on nurses' moral courage and the partially mediating part of psychological empowerment in this relationship.

Implications for Nursing Management: Nursing managers should understand the importance of moral courage in protecting patients' rights and interests, as well as in maintaining a stable nursing workforce. They should reinforce the positive influence of ethical leadership and embrace an ethical leadership style. In addition, providing relevant training to enhance nurses' psychological empowerment will help cultivate moral courage among them.

Keywords: ethical leadership; moral courage; nurses; psychological empowerment

1. Introduction

As direct providers of healthcare services, nurses play an essential role in maintaining human health and the development of healthcare. In 2023, the National Health Commission of China has clearly emphasized the need to improve nursing services, ensure nursing quality and safety, and safeguard people's health rights and interests [1]. From a humanist perspective, nursing is an ethical practice that requires nurses to have the courage to take a moral stance and remain confident in what they believe is right. However, due to the complexity of the clinical environment and other issues, as with some other developing countries [2, 3], Chinese nurses often encounter ethical dilemmas with hospital organizations, managers, colleagues, and patients, such as limited human resources, staffing insufficient to provide quality care to patients, provide "active care" to patients that have no therapeutic effect or does not remove the patient from life support dependency, some ethical dilemmas of care due to patients' financial constraints, and the malpractice of physician and colleague, which are making them in ethical dilemmas, generating negative emotions and burnout, and even hindering the development of the healthcare system [4]. Previous research has shown that nurses with moral courage are better able to deal with ethical issues and experience fewer ethical dilemmas [5] and have the ability to overcome their weakness of will when faced with situations that conflict with their professional values to take action to face ethical challenges head-on. Accordingly, studying the moral courage of nurses is of great significance in improving the quality of nursing services and safeguarding patients' rights and interests.

2. Literature Review

Moral courage is recognized globally as crucial to promoting patient safety and ethical care [6], and the core is safeguarding patients' rights [7]. As a fundamental virtue, moral courage refers to a nurse acting under pressure and following their work situation and professional orientation, taking responsibility for decision-making without fear of danger, and rational acting despite expected adverse consequences [8]. Moral courage plays a pivotal role in improving the psychological resilience of nurses and the patient's quality of life [9]. It inspires nurses to advocate for patients when their rights are threatened [10]. The main personal characteristics of nurses' moral courage include moral integrity, acting according to one's conscience, accountability, and self-actualization [8]. Previous studies on moral courage focus on measuring its levels and comparison across groups such as gender, age, educational status, and education related to medical ethics [9, 11], these do not address the mechanisms that influence moral courage. Further studies found that nurses rated their moral courage as high and considered themselves morally courageous but found it difficult to be truly courageous when faced with ethical dilemmas in practice, and still needed support from their organizations and superiors [9]. Organizational factors have been identified as influences on nurses' moral courage

[12]; however, leadership as an essential factor in organizational contexts has rarely been explored.

Brown defines ethical leadership as demonstrating normatively appropriate conduct through personal actions and interpersonal relationships and promoting such behavior to followers through two-way communication, reinforcement, and decision-making [13]. In the field of nursing, nursing managers with ethical leadership support the development of moral competence in nurses as pioneers in the nursing profession who are role models for nurses and their behaviors will influence the ethical conduct of nurses [14]. Ethical leadership attempts to create and maintain a favorable ethical climate in the work environment [15]. It is thought to be an effective leadership style in nursing management. Combing through the relevant literature revealed that studies exploring ethical leadership in nursing have yielded positive results. A study by El-Gazar et al. has shown that psychological safety mediated the link between ethical leadership and nurses' internal whistleblowing intentions, and nurse leaders can foster nurses' intentions to blow the whistle internally by adopting ethical leadership behaviors and enhancing psychological safety among nurses [16]. In addition, nurses with a high level of flourishing and who work with a manager exhibiting ethical leadership behavior are more likely to activate extra-role behavior to go the extra mile in their jobs [17]. However, moral courage, a well-recognized virtue in nursing, has not yet been the subject of a study focusing on the positive effects of ethical leadership on nurses' moral courage in the context of Chinese culture. Therefore, it is necessary to conduct this study to fill the gap in existing research and provide a basis for exploring the theory of intervention strategies for moral courage.

Psychological empowerment is the psychological condition or cognitive sense of being empowered that individuals experience in a specific work situation, which reflects the individual's positive attitude toward their work role [18]. Job meaning, competence, self-efficacy, and impact are the four parts of psychological empowerment that make up an individual's intrinsic motivation to work [19]. Studies have shown that nurses who have higher psychological empowerment can enhance innovative behavior [20], increase job satisfaction [21], and reduce ethical conflicts at work [22]. Moreover, the psychological condition of nurses is also an important factor affecting patient satisfaction [23]. According to previous research reports, Khoshmehr et al. [24] found that the relationship between psychological empowerment and moral courage positively correlates with nurses having a higher level of psychological empowerment and showing more courage in the face of internal fears [25]. In addition, there is a positive relationship between ethical leadership and psychological empowerment [26, 27]. In other words, ethical leadership enables employees to experience meaningful job roles throughout their careers. Although the results of previous studies have confirmed the two-by-two correlation between ethical leadership, psychological empowerment, and moral courage in nurses, no studies have been conducted on the coordinated role of ethical leadership and psychological empowerment together

on moral courage in nurses and the mechanism of psychological empowerment in ethical leadership and moral courage in nurses has not been explored.

3. Theoretical Framework and Hypotheses

Social learning theory [28] states that personal behavior, especially more complex behavior is learned primarily by observing or imitating the behavior of others. The theory stresses the importance of individual cognition in the learning process and the interconnectedness of cognition and the environment in influencing individual learning to produce or change a behavior. In this study, ethical leadership focuses on ethics, as a leader and role model for nurses, treating nurses with respect and fairness, not only being ethical people themselves but also creating a work environment with an ethical atmosphere for nurses [29], which is an organizational situational factor to which individuals belong; psychological empowerment brings nurses a deeper level of psychological cognition, reflecting the process of personal growth and development, which is the cognitive feeling of individuals in the work environment. Nurses with moral courage dare to speak out for the rights, safety, and justice of patients in the face of conflicts and unfavorable situations that arise in nursing practice [30], which is considered to be an essential characteristic and ethical behavior that nurses should possess.

According to Thomas and Velthouse [31], employee psychological empowerment is shaped and influenced by the work contexts, such as leaders and leaders' behavior. Based on the social learning theory, when nurses feel stimulated by the nurse manager and perceive the role as trustworthy, they are more likely to build up their psychological perceptions and gain psychological empowerment in work by observing and mimicking the attitudes and behaviors of the nurse manager. When nurses have psychological empowerment at work, they are more courageous to take practical actions to face and deal with some ethical issues in their daily work, which positively affects their moral courage. Therefore, based on the social learning theory and other relevant literature reviewed above, this study explores the potential mechanisms among ethical leadership, psychological empowerment, and nurses' moral courage. We propose the four hypotheses as follows:

1. Hypothesis 1: Ethical leadership is positively related to psychological empowerment.
2. Hypothesis 2: Psychological empowerment is positively related to moral courage.
3. Hypothesis 3: Ethical leadership is directly positively related to moral courage.
4. Hypothesis 4: Psychological empowerment mediates the association of ethical leadership with moral courage.

4. Methods

4.1. Study Design. This cross-sectional study was part of a project aimed at revealing the relationship between ethical leadership, spiritual climate, psychological empowerment,

nurse-patient relationship, and nurses' moral courage. A previous article reporting on the relationship between spiritual climate and the psychological empowerment of nurses in China has been published [32]. This article reports findings on the impact of ethical leadership on nurses' moral courage and examines the mediating role of psychological empowerment in this relationship.

4.2. Participants and Setting. Sichuan Province is located in the southwestern interior of China and consists of 5 regions: East Sichuan, South Sichuan, West Sichuan, North Sichuan, and Central Sichuan. As reported by Wang et al. [32], a questionnaire survey was conducted from February to May 2023 using the convenience sampling method among registered nurses in five hospitals selected from these five regions, all of which were tertiary care public hospitals with more than 1500 beds. All nurses were from different departments, including internal medicine, surgery, obstetrics and gynecology, pediatrics, emergency, and intensive care unit (ICU). The structural equation model (SEM), with a sample size of at least 200, was recommended [33], or 10 times the number of variables. The number of observed variables for this study was 18; thus, a sample size of 837 nurses aligned with the above rules. The study inclusion criteria for nurses were (1) registered nurses, (2) having at least 1 year of nursing in the current hospital, and (3) voluntary participation in this study. The criteria excluded nurses who were (1) not directly involved in patient care, such as on sick or personal leave and (2) nursing managers at the level of the head nurse and above.

4.3. Measurements

4.3.1. Nurse Demographic Characteristics. The research team designed its questionnaire on the demographic characteristics of nurses by reviewing the literature and questioning experts, which included gender, age, work department, years of working, education level, employment type, professional title, training in medical ethics (yes/no), and marital status items.

4.3.2. Ethical Leadership Scale (ELS). The ELS was created by Brown et al. [13] and designed to measure ethical leadership from nurses' perspectives. Bian [34] translated it into Chinese and validated it. The scale is single-dimensional and consists of 10 items. An example item is "My head nurse sets an example of how to do things correctly regarding ethics." Each item evaluates from "strongly disagree = 1" to "strongly agree = 5" with a five-point scale. The total scores on the scale ranged from 10 to 50. High scores indicate high levels of ethical leadership of the head nurses from the nurses' perspective. Cronbach's alpha coefficient for the original scale was 0.95 and 0.925 in this sample.

4.3.3. Psychological Empowerment Scale. The PES, a measure of psychological empowerment, was developed by Spreitzer [18], translated into Chinese, and validated by Sun et al. [35].

The scale contains 12 items with four subscales, including job meaning (3 items), job competence (3 items), self-efficacy (3 items), and job impact (3 items). An example item is “I am confident in my ability to do well in all aspects of my job.” Each item measures “*strongly disagree* = 1” to “*strongly agree* = 5” on a five-point scale. The total scores on the scale ranged from 12 to 60. High scores indicate high perceived psychological empowerment by nurses. Cronbach’s alpha coefficient of the four subscales of the original scale was in the range of 0.72–0.86 and 0.830–0.935, respectively, in this sample.

4.3.4. Nurses’ Moral Courage Scale (NMCS). The NMCS measures nurses’ moral courage. The original scale of NMCS was developed by Numminen et al. [8]. Wang et al. [36] after obtaining authorization from the authors of the original scale strictly followed Brislin’s two-person translation-back-translation model for the Chinese version of the NMCS. Five experts (one professor of nursing, three clinical nursing experts, and one professor of psychology) were hired to culturally adapt the Chinese version of the NMCS to make it suitable for the cultural environment of China and to assess its content validity to form the Chinese version of the NMCS. The Chinese version of the NMCS is consistent with the original scale and includes 21 items of four subscales, including moral integrity (7 items), commitment to good care of patients (5 items), compassion and authentic presence with the patient (5 items), and moral responsibility (4 items). Each item measured from “*does not describe me at all* = 1” to “*describes me very well* = 5” on a five-point scale. The total scores on the scale ranged from 21 to 105. High scores indicate high levels of nurses’ moral courage. Cronbach’s alpha coefficient of the four subscales of the original scale was in the range of 0.778–0.902 and 0.866–0.907, respectively, in this sample.

4.4. Ethical Consideration. The study was approved by the Ethics Committee of the Sichuan Provincial People’s Hospital, University of Electronic Science and Technology of China, the first author’s institution. Researchers explained the research’s aim, significance, and precautions to all participants and distributed the questionnaire only after receiving each participant’s informed consent. All data collected were anonymized, and the results of the completed questionnaires were not visible to anyone other than the researcher and the respondents themselves and were used only for the study.

4.5. Data Analysis. The descriptive statistics, univariate analyses, Cronbach’s α , and correlations of each variable used the IBM SPSS 27.0 (IBM, New York, NY, USA) to analyze, using frequency and percentage for count data and mean \pm standard deviation ($M \pm SD$) for normally distributed measures. Pearson’s coefficient was used to examine the correlations among ethical leadership, psychological empowerment, and nurses’ moral courage, modeling a hypothesized model of ethical leadership on moral courage in

nurses and testing the internal mechanisms by AMOS 26.0 (IBM, New York, NY, USA). The bootstrapping procedure of 5000 resamples tested the significance of the mediating effects model, and the 95% confidence interval without zero considered the mediating effect significant. Differences are two-sided, and a p value below 0.05 is considered statistically significant.

5. Data Collection

We used paper-based questionnaires for our survey. First of all, we contacted the director of the nursing department of each investigated hospital, explaining in detail the purpose, significance, and content of this study’s survey. After obtaining the consent, the nursing department of the investigated hospitals arranged for one person in charge to dock with the researchers. Then, the researchers used a unified instruction to inform the people in a ward of the investigated hospital about this study’s purpose, significance, data collection methods, and quality control methods. Finally, the researchers sent the nurses a paper version of the questionnaire to fill in. The questionnaires were filled out during each department’s morning shift or group meeting and collected on the spot after completion. Respondents involved in questionnaire completion were (1) informed that participation was voluntary and that they could withdraw at any time without reason; (2) the study was anonymous and the results of questionnaire completion would not be seen by coworkers, leaders, etc.; and (3) the survey information obtained was to be used only for nursing study. In total, 851 nurses completed and returned the questionnaires, of which 14 questionnaires were dropped from the analysis due to incomplete completion, and 837 valid questionnaires were analyzed (response rate: 98.35%).

6. Results

6.1. Demographic Characteristics of Nurses and the Univariate Analyses of Nurses’ Moral Courage. Among 837 nurses, 94.1% were female, 80.9% had a bachelor’s degree, 30.7% had a work experience of 6–10 years, and 69.2% were married. In addition, univariate analyses showed significant differences in gender, age, departments, years of working, professional titles, and training in medical ethics (yes/no) and marital status showed significant differences in nurses’ moral courage scores. The details are given in Table 1.

6.2. The Score of Nurses’ Moral Courage in the Current Study. The total scores ($M \pm SD$) of nurses’ moral courage in Sichuan Province, southwest China, was 80.68 ± 12.04 , which is mainly moderate to high, and the scores of subscales are detailed in Table 2.

6.3. Correlations for Variables of the Study. Pearson’s correlation analysis showed that ethical leadership and psychological empowerment were positively correlated ($r = 0.374$, $p < 0.01$), as were moral courage ($r = 0.341$, $p < 0.01$). In addition, positive correlations between

TABLE 1: Nurse's demographic characteristics and differences in moral courage.

Variables	n (%)	Nurses' moral courage scale	
		Mean (SD)	t/F
Gender			-2.063*
Male	49 (5.9)	3.68 ± 0.49	
Female	788 (94.1)	3.85 ± 0.58	
Age			3.937*
18~25	105 (12.5)	3.81 ± 0.58	
26~35	497 (59.4)	3.80 ± 0.59	
36~45	174 (20.8)	3.89 ± 0.53	
> 45	61 (7.3)	4.05 ± 0.44	
Work department			4.429*
Internal medicine	265 (31.7)	3.86 ± 0.60	
Surgery	183 (21.9)	3.90 ± 0.55	
Obstetrics and gynecology	31 (3.7)	3.79 ± 0.61	
Pediatrics	78 (9.3)	3.76 ± 0.56	
Emergency	60 (7.2)	3.79 ± 0.49	
ICU	87 (10.4)	2.60 ± 0.57	
Others	133 (15.8)	3.84 ± 0.57	
Years of working			5.700*
1~5	205 (24.5)	3.77 ± 0.57	
6~10	257 (30.7)	3.84 ± 0.60	
11~15	213 (25.4)	3.79 ± 0.58	
> 15	162 (19.4)	4.00 ± 0.50	
Education level			1.035
Junior college	138 (16.5)	3.87 ± 0.56	
Bachelor's degree	677 (80.9)	3.84 ± 0.57	
Master's degree or above	22 (2.60)	3.68 ± 0.65	
Employment type			-1.568
Formal	148 (17.7)	3.91 ± 0.53	
Contracted	689 (82.3)	3.83 ± 0.59	
Professional title			8.753*
Junior	459 (54.8)	3.81 ± 0.61	
Middle	319 (38.1)	3.83 ± 0.53	
Senior	59 (7.1)	4.14 ± 0.43	
Training in medical ethics			-4.701*
Yes	596 (71.2)	3.90 ± 0.56	
No	241 (28.8)	3.70 ± 0.57	
Marital status			3.534*
Single	226 (27.0)	3.78 ± 0.57	
Married	579 (69.2)	3.86 ± 0.57	
Widowed or separated	32 (3.8)	4.04 ± 0.56	

* $p < 0.05$.TABLE 2: The scores of nurses' moral courage in the current study ($n = 837$).

Variables	Items	Scores ($M \pm SD$)	Means ($M \pm SD$)
Moral courage scale	21	80.68 ± 12.04	3.84 ± 0.57
Moral integrity	7	26.53 ± 5.06	3.79 ± 0.72
Commitment to good care of patients	5	18.64 ± 3.89	3.73 ± 0.78
Compassion and true presence with patient	5	19.56 ± 3.55	3.91 ± 0.71
Moral responsibility	4	15.94 ± 2.87	3.99 ± 0.72

psychological empowerment and moral courage can be found ($r = 0.518$, $p < 0.01$), and the relationships between each scale subscale are detailed in Table 3.

6.4. SEM of Study Variables. As shown in Table 4, the model offers a satisfactory model fit: $\chi^2 = 2156.36$, $df = 849$, $\chi^2/df = 2.540$, $RMSEA = 0.043$, $SRMR = 0.047$, $NFI = 0.911$,

$TLI = 0.941$, and $CFI = 0.944$, and all indicators met the requirements. As shown in Figure 1 and Table 5, the mediating effect value of psychological empowerment is 0.247, which accounts for 64.8% of the total effect value of 0.381. Psychological empowerment partially mediates the relationship between ethical leadership and nurses' moral courage.

TABLE 3: Correlation analysis of ethical leadership, psychological empowerment, and moral courage (n = 837).

Variables	1	2	3	4	5	6	7	8	9	10	11
(1) Ethical leadership scale	1										
(2) Psychological empowerment scale	0.374**	1									
(3) Job meaning	0.354**	0.727**	1								
(4) Job competence	0.274**	0.746**	0.601**	1							
(5) Self-efficacy	0.286**	0.778**	0.449**	0.593**	1						
(6) Job impact	0.225**	0.732**	0.265**	0.253**	0.381**	1					
(7) Moral courage scale	0.341**	0.518**	0.426**	0.431**	0.387**	0.333**	1				
(8) Moral integrity	0.302**	0.421**	0.331**	0.328**	0.331**	0.283**	0.821**	1			
(9) Commitment to good care	0.195**	0.310**	0.287**	0.293**	0.198**	0.181**	0.743**	0.437**	1		
(10) Compassion and true presence	0.279**	0.483**	0.382**	0.412**	0.365**	0.313**	0.818**	0.517**	0.498**	1	
(11) Moral responsibility	0.290**	0.413**	0.343**	0.324**	0.322**	0.265**	0.729**	0.453**	0.376**	0.608**	1

**p < 0.01.

TABLE 4: Model fitting index.

Statistical test	χ^2	df	χ^2/df	RMSEA	SRMR	NFI	TLI	CFI
Acceptable threshold	—	—	< 3.00	< 0.08	< 0.05	> 0.90	> 0.90	> 0.90
Hypothesized model	2156.36	849	2.540	0.043	0.047	0.911	0.941	0.944

Abbreviations: χ^2/df = the chi-square degrees of freedom; CFI = comparative fit index; df = degrees of freedom; NFI = normed fit index; RMSEA = root mean square of approximation; SRMR = standard root mean square residual; TLI = Tucker-Lewis index.

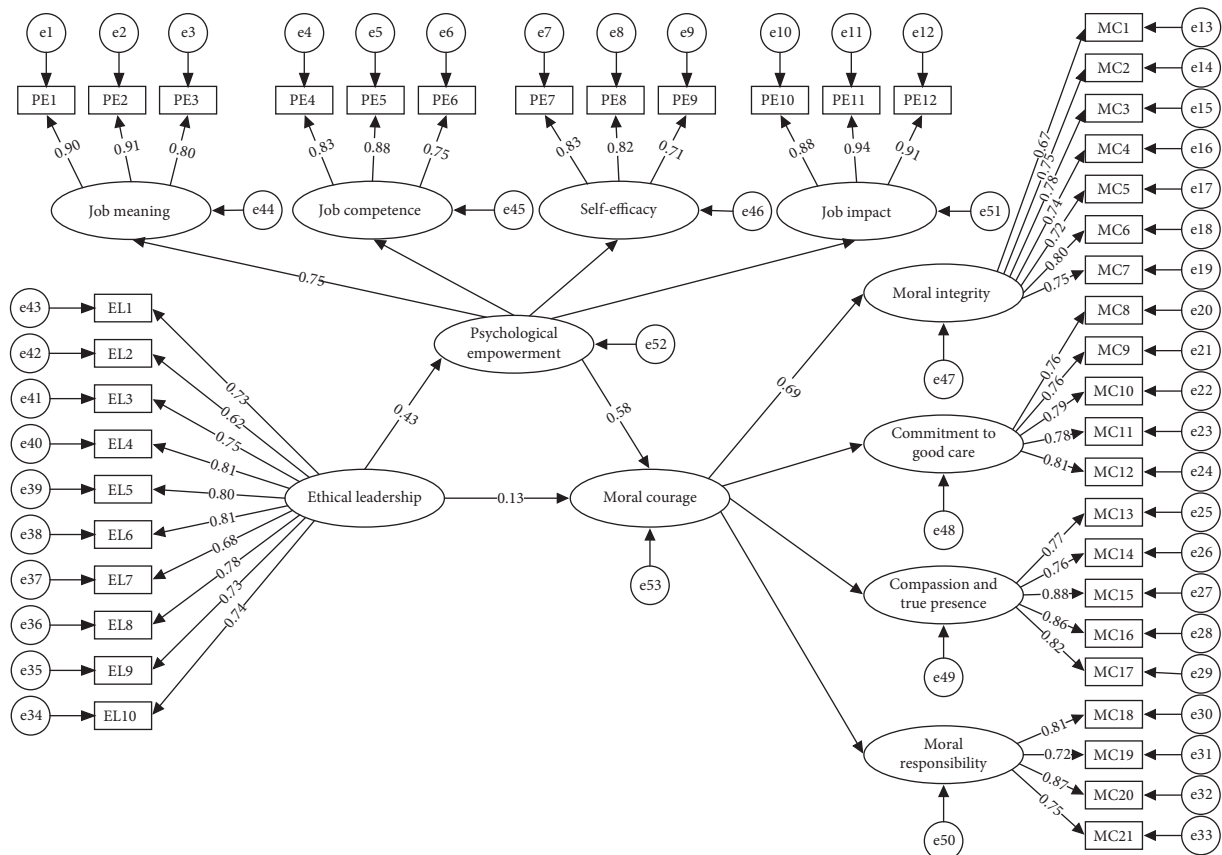


FIGURE 1: The final model of moral courage among nurses (with standardized regression coefficients). **p < 0.01. EL1-EL10: items of ethical leadership; PE1-PE12: items of the four dimensions of psychological empowerment; MC1-MC21: items of the four dimensions of moral courage.

TABLE 5: Results of mediation analyses.

Model path	Estimate	Se	Z	95% CI		p value	Effect ratio (%)
				LLCI	ULCI		
<i>Direct effect</i>							
EL → MC	0.134	0.046	2.913	0.040	0.222	0.006	35.2
EL → PE	0.425	0.041	10.366	0.347	0.510	0.001	
PE → MC	0.580	0.059	9.831	0.457	0.688	0.001	
<i>Indirect effect</i>							
EL → PE → MC	0.247	0.036	6.861	0.185	0.326	0.001	64.8
Total effect	0.381	0.040	9.525	0.300	0.459	0.001	

Abbreviations: EL = ethical leadership; MC = moral courage; PE = psychological empowerment.

7. Discussion

This study explored the relationship among ethical leadership, psychological empowerment, and moral courage from nurses' perspectives, established the impact of ethical leadership on nurses' moral courage, and examined the partially mediating role of psychological empowerment in this relationship. To the best of our knowledge, this study is the first to investigate these associations and explore the potential mechanisms.

The findings of this study showed that the total scores of moral courage in nurses are moderate to high, which is analogous to other studies [37, 38]. It indicates that despite the complex and challenging healthcare environment, nurses are willing to provide good nursing care to patients and advocate for protecting their rights and interests. In this study, the highest score (3.99 ± 0.72) for moral responsibility indicated that nurses possess essential ethical qualities and can deal with ethical challenges at work with practical actions. The sample of nurses in this study were all from public tertiary-level hospitals in Sichuan Province, which, along with the high-quality development of public hospitals, requires nurses to possess professional knowledge and the ability to provide optimal solutions for patients when they face compromised rights and interests. The lowest commitment to good care of patients score (3.73 ± 0.78) indicates that in practice, nurses may compromise on protecting the rights of patients and remain silent on ethical issues that arise in the care process, and the reasons for this may be analyzed to be related to insufficient training in this area, lack of supportive managers, fear of adverse consequences due to the fear of risk-taking and bullying, and loss of job [39]. Moral courage as a moral virtue enables nurses to make the right decisions and behaviors when faced with ethical distress and helps nurses deal with ethical challenges with aplomb [40]. It is recommended that hospitals and administrators create a work environment that promotes teamwork and respectful communication. Clinical nurses should practice a "patient-centered" orientation, have solid nursing expertise and skills, understand their realities, and provide nursing care and services guided by evidence-based practice theories and nursing quality standards. Only then is it possible to gain the respect and recognition of colleagues, patients, and families when faced with difficult clinical decisions.

The results of the univariate analysis revealed that nurses' moral courage scores varied by gender, age, work

department, years of working, professional title, whether or not had received medical ethics training, and marital status. In this study, the moral courage of male nurses was lower than that of female nurses, and one possible explanation is that under the influence of traditional concepts in Chinese society, male nurses not only suffered from prejudice and discrimination from society, patients, and family members but also faced hostility from within the healthcare workforce [41], which greatly affected their enthusiasm for nursing, and thus male nurses mostly adopted the negative strategy of avoidance in the face of the reality of ethical dilemmas. Older nurses, who have more years of working, and have higher professional titles, show more morally courageous behaviors, which is largely similar to the findings of existing studies [12, 38], and this may be because younger nurses usually undertake routine and general patient care, lack experience of moral courageous actions, and become overwhelmed when encountering situations triggering ethical distress; similarly, nurses with higher job titles tend to undertake more specialized and skilled care of acute and critical patients, and as their work experience grows, individuals become more aware of special situations and able to recognize behaviors and are more comfortable in dealing with ethical dilemmas or conflicts. ICU is the setting where moral dilemmas and challenges most often arise, and previous studies have shown that ICU nurses have higher levels of moral courage [42, 43]. However, in this study, nurses working in ICUs showed lower levels of moral courage, the reason for this may be analyzed to be related to the different time points of data collection, as the survey sample of this study was collected after the opening of the new coronary pneumonia epidemic, whereas the samples of the other studies originated from the period of the new coronary pneumonia pandemic, during which time, admissions to the ICUs in all hospitals increased dramatically, and the nurses would have been faced with ethical dilemma situations more frequently. This is consistent with Numminen's [44] conceptual analyses of moral courage which suggest that "experience" is a prerequisite for the development of moral courage. In addition, the moral courage of nurses who had received medical ethics training was higher than those who had not, which is consistent with a study by DeSimone [45] regarding the positive effect of ethical knowledge base, ethics training, and education on the level of moral courage. Finally, the results of this study also showed that marital status may also be a factor influencing moral courage among

nurses, and unmarried nurses had lower moral courage scores than married, the reason for this may be that unmarried nurses have a lower level of social support, receive less emotional support, and are more isolated, which may affect their courage to speak up and act courageously in situations filled with challenging ethical dilemmas. These indicate that managers should pay more attention to the work status of junior nurses, nurses working in ICUs, and single nurses; support them to be able to bravely express their views when they encounter ethical dilemmas at work; and respect their ethical decision-making while ensuring that patients' rights and interests are not compromised. As a component of nurses' moral competence, moral courage is a personal characteristic that can be learned and developed, and hospital administrators should include training courses on moral courage in their daily training to encourage nurses to play the role of moral courage in practice and bravely carry out their obligations to protect patients. Some countries have included moral courage training courses in their teaching curricula with more positive results, and their training methods are worth exploring and practicing.

Our study shows that ethical leadership has a positive impact on nurses' moral courage, consistent with several existing studies suggesting a significant positive relationship between ethical leadership and moral courage [46, 47], nurses perceive a higher level of ethical leadership from nurse managers, and more moral courage they are inspired to have Traditional Chinese culture often emphasizes the differences between the upper and lower levels and the order of respect and inferiority, with leaders often occupying a more crucial dominant position in an organization and having a more prominent influence on their subordinates. When nurse leaders demonstrate ethical leadership behaviors that are more focused on the work process, the interests of nurses, and doing the right thing, they are more effective in inspiring the formation of moral courage in nurses. In addition, the present result supports the previous finding of a positive correlation between ethical leadership and psychological empowerment [27]. Psychological empowerment is a motivational state that is achieved through a combination of job meaning, autonomy, self-efficacy, and perceived impact of work. It has a positive orientation towards employees' work so that they are interested and feel empowered to shape their work environment. Ethical leadership often takes into account the growth and developmental needs of each nurse, motivates nurses to perform core job duties, and puts them in a position where they can experience appropriate and meaningful work roles in their careers, thereby influencing their psychological empowerment and motivating them to be proactive rather than passive in their work. Finally, this study showed a positive relationship between psychological empowerment and moral courage. When nurses have high levels of psychological empowerment, they will be more likely to demonstrate higher levels of morally courageous behavior. Malak et al. found that nurses with high levels of psychological empowerment believe in their ability to do all things well at work, are less psychologically stressed in the work environment, and are more motivated to serve their patients [48]. Thus, it can be seen that having

a high level of psychological empowerment will motivate nurses to comply with the code of ethics and still choose to protect patient's rights and interests when their legitimate rights and interests are compromised, without fear of being threatened, fearful, or even losing their jobs.

The results of SEM showed that ethical leadership had a direct effect on nurses' moral courage (95% CI excluding 0, $p < 0.05$), and ethical leadership could also have an indirect effect on nurses' moral courage through psychological empowerment (95% CI excluding 0, $p < 0.05$), and that psychological empowerment partially mediated the relationship between ethical leadership and nurses' moral courage, which support Hypothesis 4 of the study. The results of this study show that ethical leadership directly and positively influences nurses' moral courage, with the direct effect accounting for 35.2% of the total effect. According to social learning theory, personal behaviors, especially more complex behaviors, can be acquired by individuals by observing and learning to imitate the behaviors of their role models; however, the type of behaviors accepted and the effectiveness of their implementation depend on the role of the role model. Previous research has shown that leader style is the most important situational factor influencing employees' moral courage [49]. As leaders and role models for nurses, ethical leaders respect nurses, handle all matters at work with fairness and integrity, and encourage nurses to speak up for patient rights when faced with situations that undermine patient rights and interests in nursing practice, which in turn leads to the conscious occurrence of moral courage among nurses. Therefore, nursing managers should strengthen their ethical leadership construction, set an example in their work, and play an exemplary role; for hospital organizations, they should establish a correct orientation for selecting and employing people, and pay attention to selecting and employing managers with moral leadership qualities.

Our study found that the influence of ethical leadership on nurses' moral courage can also be indirectly influenced by psychological empowerment, i.e., ethical leadership can promote nurses' psychological empowerment and then stimulate nurses' moral courage, and the size of the mediating effect of psychological empowerment between the two is 0.247, and the indirect effect accounts for 64.8% of the total effect, suggesting that psychological empowerment plays an important role between ethical leadership and nurses' moral courage. This suggests that moral leadership plays an important role in the relationship between ethical leadership and the moral courage of nurses. Ethical leadership makes nurses feel stronger psychological empowerment in their work so that they dare to do the right thing in favor of patients' rights and interests when they encounter situations that are contrary to patients' rights and interests in their practice. Therefore, to improve the moral courage of nurses, it is important to improve the level of ethical leadership of managers and the nurses' psychological empowerment. The results of this study support the relationships and mechanisms proposed in the social learning theory model, whereby a combination of personal cognition and the environment influences the behavior of the learning

individual. Ali Awad and Al-Anwer Ashour [50] also reached a similar conclusion, in whose research, ethical leadership affected moral courage through ethical climate as a mediating variable. Based on the above discussion, intervening in nurses' moral courage from the perspective of psychological empowerment may yield better results. It suggests that nursing managers should integrate ethical awareness and ethical behaviors into the daily work of clinical nurses to enhance the intrinsic motivation and sense of the meaning of nurses' work, which will, in turn, promote the formation of morally courageous behaviors.

8. Limitations

This study has some limitations to take into account. First, the study was only conducted in Sichuan Province, southwest China, with limited geographic areas and hospitals involved, therefore, the results obtained need to be validated more extensively in other regions or countries. Second, it may have resulted in reporting potential bias since we relied on self-report questionnaires, there may be a self-glorification of the investigator. Furthermore, the study used convenience sampling, and despite an adequate sample size, the number of male nurses in our study was too small, which may have contributed to selection bias. Finally, the cross-sectional design demonstrates that a causal relationship is not possible, and future research could try to conduct qualitative and longitudinal studies.

9. Conclusions

This study explored the correlation between nurses' perceived ethical leadership, psychological empowerment, and moral courage. As expected, ethical leadership and psychological empowerment influenced moral courage among nurses, and psychological empowerment partially mediated their relationship. Nursing managers must adequately recognize the link between these variables and adopt an ethical leadership approach to increase nurses' psychological empowerment and improve their moral courage.

10. Implications for Nursing Management

The results of this study show that the moral courage of nurses is moderately high, and ethical leadership and psychological empowerment positively influence it. We suggest hospital administrators pay attention to developing moral courage in nurses by emphasizing that ethics is integral to nursing practice. For example, training on moral courage as part of the nursing ethics curriculum and providing nurses with knowledge of moral courage. Similarly, nursing management should make a prerequisite to understand the meaning of ethical leadership and to identify with the sense of ethical leadership, take the initiative to learn the relevant theoretical knowledge of leadership and ethics, enhance the knowledge and awareness of the ethical leadership style, and create a good working environment and ethical atmosphere so that nurses can obtain psychological empowerment, thus stimulating the potential for the formation of moral courage in nurses.

Data Availability Statement

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Ethics Statement

The first author's institution approved this study, the Sichuan Provincial People's Hospital, University of Electronic Science and Technology of China (Approval number: 202350).

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

Xuan Wang was mainly responsible for the study design, data collection, data analysis, paper writing, and revision. Lijuan Zhou was primarily responsible for data collection and data analysis. Xianxiu Wen was responsible for the research design, data collection, and quality control of the article. Li Gou was accountable for the development of the study protocol, data collection, critical review of the paper, and quality control of the article.

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Research Article

Facilitating Evidence-Based Practice among Nurses in a Tertiary General Hospital: A Six-Year Practice of an Implementation Strategy Informed by the i-PARIHS Framework

Yuping Zhang , Zhiting Guo , Shuangyan Xu, Meiqi Yao, Xiuqin Feng, Meijuan Lan , and Jingfen Jin 

Nursing Department, The Second Affiliated Hospital of Zhejiang University School of Medicine, Hangzhou, Zhejiang, China

Correspondence should be addressed to Jingfen Jin; zrzjkh1@zju.edu.cn

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Aims. To develop an evidence-based practice (EBP) facilitating strategy informed by the Integrated Promoting Action on Research Implementation in Health Services (i-PARIHS) framework and evaluates the strategy's effectiveness on promoting EBP. **Background.** Nurses are increasingly expected to use research evidence in practice to improve patients' outcomes, but the application of such evidence is still unsatisfactory. The facilitation of EBP in nursing needs the organization and the individual levels. **Methods.** Based on an analysis of EBP-promoting strategies and expert consultation, the core team of the nursing department developed an EBP group-based and project-oriented strategy under the guidance of the i-PARIHS framework. The strategy was implemented for six years and evaluated by a longitudinal design. The validated Chinese version of the self-reported Evidence Based Practice Questionnaire (EBPQ) was used to assess the attitudes, knowledge, and practice of the nurses. **Results.** The mean score of the total EBPQ was 4.46 (SD = 0.92) after one year of the EBP strategy, and the scores for knowledge, attitudes, and practice of EBP members were higher than those of general nurses ($p < 0.05$). After four years, EBP members' scores continued to increase. EBP groups conducted 51 EBP projects in the areas of emergency nursing, surgical and medical nursing, critical care, and so forth. Of these, 33 projects improved nursing practice by changing nursing procedures, upgrading nursing tools, and developing nursing standards, resulting in improved patient outcomes. **Conclusion.** The EBP group-based and project-oriented strategy can promote EBP. The composition of the EBP group, the annual audit of EBP projects, and the roles of internal and external facilitators were key components of this EBP-facilitating strategy. **Implications for Nursing Management.** The strategy is an organizational-level EBP-facilitation approach which can improve nurses' academic preparation for EBP through ongoing training and sustained EBP behavior that involves annual projects.

1. Background

Evidence-based practice (EBP) involves integrating the current best evidence with clinical expertise, information on patient preferences, and available resources into the clinical decision-making process [1, 2], and it is critical to achieving optimal patient outcomes at the lowest possible cost [3]. As one of the important groups of practitioners in health care, nurses are increasingly expected to translate research evidence into practice to improve patients' outcomes [4–6]. Considerable research, resulting in the development of various theories/frameworks, policy, and funding as related

to EBP, has been conducted [7–10]. Recent reviews show that education programs, reminders, and the use of champions help to ensure that nurses are aware of and use research evidence in clinical practice [11–13]. Nevertheless, applying the best research evidence into practice remains challenging. Further, there is limited understanding regarding which facilitation approaches are the most effective in enhancing evidence-based practice in certain contexts. [14].

Due to the dynamics and variability of evidence, complexity of the clinical environment, and differences in the capabilities of nurses, the implementation of EBP is still

unsatisfactory, especially in low- and middle-income countries. Researchers have identified barriers to implementing evidence-based practice [15, 16] that include individuals' lacking the necessary knowledge and skills as well as organizations' not having enough funding or institutional support for EBP, among others [15–18]. Thus, it is critical to find ways to enhance the integration of research evidence into nursing practice.

In China, researchers have conducted surveys on the attitudes, knowledge, and skills of registered nurses (RNs) as related to EBP [19, 20]. Most nurses had positive attitudes toward EBP but lacked sufficient knowledge and skills for implementation [20, 21]. Despite the considerable effort taken to implement EBP in China and an increase in the number of EBP projects since 2013 [22, 23], there is an urgent need for EBP resources, increased support from clinical management, and collaboration between academic and clinical institutions. Further, unlike the case of physicians who have greater EBP knowledge [24] and hold more authority in medical domains, the focus of EBP implementation in nursing needs to be at the group or organization and individual levels [25]. Thus, our research aims to develop a strategy that includes the organizational aspect of facilitating EBP in a general hospital.

Facilitating EBP among nurses in a tertiary general hospital requires supportive evidence and a theoretical framework. The Promoting Action on Research Implementation in Health Services (PARIHS) framework is a multidimensional approach that posits that the successful implementation of evidence into practice is influenced by three key factors: the quality and type of evidence, characteristics of the setting or context, and the manner in which the evidence is introduced into or facilitates practice [26, 27]. PARIHS has been used extensively in a diverse range of settings and with various uses, including planning and delivering an intervention, data analysis, and the evaluation of study findings [26]. Nevertheless, the PARIHS framework has been criticized for lack of clarity in regard to its elements/subelements, definitions of key outcomes, and the relationships among elements/subelements [28]. The Integrated Promoting Action on Research Implementation in Health Services (i-PARIHS) framework was developed and refined by the PARIHS group and is now used in evidence-based projects globally [27]. The i-PARIHS framework addresses concerns about the conceptualization of as well as relationships and dynamics among the main framework elements, namely facilitation, innovation, recipients, and context [27].

We hypothesized that the i-PARIHS framework also is suitable to guide a program for facilitating EBP in our hospital. This hypothesis is based on the framework's comprehensive approach, which considers the complex interplay of evidence, context, and facilitation, an approach that is particularly relevant, given the unique challenges that nurses face. Based on the analysis of available knowledge translation strategies and characteristics of the hospital and nursing environment, we set up and implemented a group-based and project-oriented EBP strategy that has been sustained for six years. This study presents the development

of this strategy and evaluates its effectiveness to shed light on the strategies and conditions that contribute to its success and limitations and to provide insight that can inform future efforts to promote EBP among nurses in similar settings.

2. Methods

2.1. Study Design. This study developed an EBP group-based and project-oriented strategy informed by the i-PARIHS framework and used a longitudinal design to observe the strategy's effectiveness. The framework was used to guide the development of the EBP-facilitating strategy at the hospital level. The strategy was practiced in a general hospital under the supervision of the nursing department for six years. The practice of the strategy from 2016 to 2019 was considered as the implementation phase. Also, year 2020–2021 was the sustained phase.

2.2. Setting and Participants. The study was conducted in a tertiary general hospital located in Hangzhou, Zhejiang Province, China. Because the hospital has a number of specialties, the Nursing Department was able to select six specialties which had more advantages and resources, and to set up EBP groups in 2016: Emergency and Intensive Care, General Surgery, Orthopedics, Neurology and Psychiatry, Gastroenterology and Respiratory Medicine, and Nursing Management. Nurses in these related departments who met the criteria could apply to participate in the study. Recruitment criteria included being committed to EBP, having certain skills related to EBP, priority will be given to candidates holding a master's degree or being a head nurse. A total of 34 nurses were recruited into six EBP groups based on these recruitment criteria. The groups were managed by the core team of the nursing department on an annual basis, and the number of groups was increased to 11, with 96 nurses, in 2021. The specialties of Neurosurgery, Intravenous Therapy, Operating Room, and Enteral Nutrition were added, and Emergency and Intensive Care were separated into two groups. The EBP group formation process and membership renewal are described in detail in the section of the EBP-facilitating strategy. Table 1 shows the number of groups and nurses in each year.

2.3. EBP-Facilitating Strategy. A core team of the nursing department was set up to develop the EBP-facilitating strategy. The team included the director of nursing; vice director of nursing, who was in charge of nursing research and education; and three senior nurses who had received EBP training outside the hospital. The project was "Facilitating evidence-based nursing from the hospital level," and the goal was to promote EBP for the nurses. Meetings of experts in the core team were conducted. Based on the analysis of EBP-promotion strategies and characteristics of the hospital and nursing environment, the team developed an EBP group-based and project-oriented strategy under the guidance of the i-PARIHS framework. In the framework, successful implementation involves facilitation of the innovation in coordination with the recipients in their local,

TABLE 1: Number of groups and nurses in each year.

Year	Groups (<i>n</i>)	Nurses (<i>n</i>)	Head nurse/supervisor (<i>n</i> , %)	Master's degree (<i>n</i> , %)
2016	6	34	13 (38.24)	13 (38.24)
2017	8	49	20 (40.82)	16 (32.65)
2018	8	54	17 (31.48)	26 (48.15)
2019	8	56	20 (35.71)	29 (51.79)
2020	10	83	28 (33.73)	35 (42.17)
2021	11	96	28 (29.17)	46 (47.92)

organizational, and healthcare system contexts [27]. The core elements of the framework are facilitation, innovation, recipients, and context [27]. The identification and integration of the core elements of our strategies are presented in Table 2.

The recipients of this project were the nurses who formed several EBP groups. Initially, six EBP groups, each with a specialty, were set up after an applicant assessment process. Each group elected one person as the leader to run each EBP project on an annual basis. Facilitation is the dynamic component that is involved in evaluating, harmonizing, and merging the other three elements [27]. The facilitation process is shown in Figure 1.

As the internal facilitators, the core team of the nursing department knows the level of EBP skills among the nurses. They invited experts from the Fudan University JBI Evidence-based Nursing Cooperation Center as external facilitators, which provided a structured training program and oversight of the conduct of each EBP project. The first training program involved education and assignments that involved choosing and identifying an EBP problem, reporting the retrieval results, evaluating the quality of the included literature, conducting a meta-analysis, and developing a plan of evidence application project. The training had 32 hours and lasted for two months, and the projects were evaluated at the end of the year. During the second year, the EBP groups continued to conduct new EBP projects.

The core team influenced and coordinated the process, including making decisions to increase or adjust the members and number of groups according to the qualifications of the members and groups. The coordinator updated the group membership annually and arranged for continuous training for new members by an external EBP training program or internal training by experienced members. The training for the new members had four aspects, including identification of an EBP problem, database retrieval, evaluation of the quality of the literature, and the process of evidence application. The training usually was conducted in the first quarter of the year. In addition to the training, the core team organized at least three meetings to assess the process of the EBP projects each year, including the choice of EBP projects, and engaged in ongoing assessment and with the conclusion of the projects. The external facilitator attended meetings more frequently during the first several years until the internal facilitators were sufficiently experienced and groups had gained more experience in implementation of evidence. From 2020, the practice of the strategy entered the sustained phase, the

number of EBP group members increased considerably, as the core team planned to extend the activities of EBP throughout the hospital. Then, a second structured training program was held, for which the main focus of the training was the application of evidence.

2.4. Data Collection. The validated Chinese version of the self-report Evidence-Based Practice Questionnaire (EBPQ) was used to assess the attitudes, knowledge, and practice of the group members of the EBP projects and general nurses in the same hospital.

The EBPQ was developed by Upton and Upton [29] and was translated into Chinese by Yang and Tang in 2009 [20]. The Chinese version of the EBPQ consists of 24 items allocated to three subscales: knowledge/skills (14 items), attitudes (4 items), and practice (6 items). Each item is rated from 1 to 7, with a higher score as indicating more knowledge, a more positive attitude, or better utilization in regard to EBP. Cronbach's alpha of the Chinese version was 0.94, and the subscales' values were 0.79 to 0.94 [20]. The response to each item was deemed positive if the score exceeded 4. For data analysis, we applied the means of the scores of each subscale and the total EBPQ score. The Chinese version of EBPQ was obtained from the authors for use.

The first survey was administered to EBP group members through a manual questionnaire during February 2017 (T1) after the EBP-facilitating strategy had been applied for one year. The same questionnaire was also administered to general nurses who attended in-service training classes within the hospital. To ensure timely and efficient data collection, we employed convenience sampling to select four classes that were held for different levels of nurses. This method allowed us to readily access a pool of nurses with varying levels of expertise who were available and willing to participate in the study. The second survey was electronic, administered to EBP group members during December 2019 (T2), when the EBP-facilitating strategy had been applied for four years.

During the ongoing assessment and for the concluding report of the EBP projects each year, the core team of the nursing department assessed the results and used a self-designed form to create a record of the project. The form included the information on the project, whether the evidence was applied to clinical practice, and the reasons for the lack of success, if relevant, of the application. The information included the title of the project, group name, setting and population, and main clinical and academic

TABLE 2: Identification of core elements in the EBP-facilitating strategy.

Core element	Strategy
Innovation	Enhance the evidence-based practice skills of nurses Promote the application of research evidence to inform the innovation
Recipients	EBP groups formation process: (a) The core team developed the recruitment criteria Recruitment criteria: committed to EBP; have skills related to EBP; encourage master's degree and head nurses to participate (b) Nurses submitted the application to nursing department (c) The core team assessed the applicants and set up EBP groups. Principles: each group had nurses from the same or related specialties and comprised nurses in a leadership position (head nurse/supervisor/vice director) and who had a master's degree
Context	Local level Same or related specialties had a similar setting and environment, which ensured the same interest in choosing EBP questions and enabled the implementation of research evidence Organization level Hospital and nursing department supported and provided training, multidiscipline collaboration, and necessary facilities External healthcare system level The priority was to narrow the gap between evidence and practice and improve patients' outcomes; this was hampered, however, by a lack of EBP skills
Facilitation	Facilitators Internal facilitator: the core team of nursing department; one member was assigned as the coordinator of this project External facilitator: three members of the Fudan University JBI Evidence-based Nursing Cooperation Center Facilitation strategies The core team organized a two-month intermittent training of EBP guided by a well-educated EBP team Each EBP group was required to conduct one EBP project per year. Regular meetings were held for audits of the projects The coordinator tracked the process of each EBP project and provided regular feedback The coordinator reviewed and updated the members of EBP groups annually An external facilitator navigated the implementation of evidence in projects

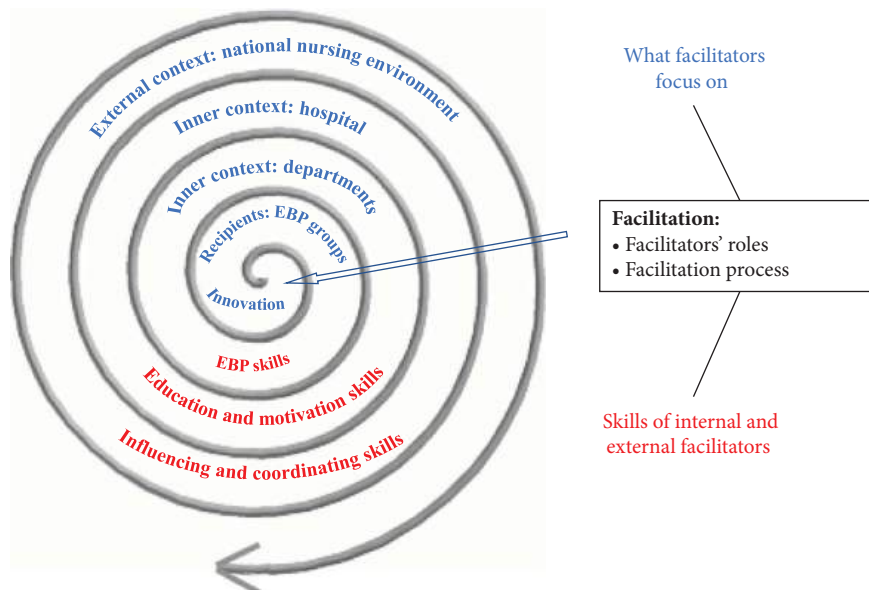


FIGURE 1: Facilitation process of the EBP-facilitating strategy.

outcomes (e.g., whether a paper was published, whether expert consensus was achieved). The main reasons for a lack of success included insufficiency of the evidence, small gap between current practice and evidence, stakeholder conflicts, and insufficient leadership during evidence implementation. Two members of the core team determined the reasons after discussion with the leader of each EBP group.

2.5. Data Analysis. The scores for the knowledge/skills, attitudes, and practice subscales were continuous variables, which were presented as means and standard deviations (SD). The differences between the two groups and the two time points were analyzed using an unpaired Student's *t*-test. A two-tailed *p* value of <0.05 was considered statistically significant. The analyses were performed using SPSS 24.0.

3. Results

The mean scores of the total EBPQ were 4.46 (SD = 0.92) after the training and one year of the EBP-facilitated program. The scores for knowledge, attitudes, and practice of the EBP group members were higher than those of general nurses (all *ps* < 0.05). Among EBP members, the scores for knowledge, attitudes, and practice increased after four years of the program (T2), and the differences were significant (all *ps* < 0.05). Table 3 presents these results.

EBP groups conducted 51 EBP projects that covered emergency nursing, surgical and medical nursing, critical care, nursing management, and so forth. Among the projects, 33 were found to improve nursing practice, as seen in changes of nursing procedures, upgrading of tools, development of nursing standards, and improvement in patient outcomes. For example, the emergency group formulated an EBP for rewarming for patients with traumatic hypothermia, including developing the warming-starting standards, clinical warming methods, and monitoring frequency. A total of 41 patients with traumatic hypothermia participated in the nursing program. The mean temperature of patients was (36.31 ± 1.12) °C when leaving emergency room, and the increase in patients' temperature was (0.82 ± 0.56) °C, which was higher than that before the EBP program (*p* < 0.05). In addition, the percentage of patients with chills was 2.44%, which is significantly lower (*p* < 0.001). Finally, 18 projects were not successful. The main reasons included stakeholder conflicts (6 projects), insufficient leadership during evidence implementation (5 projects), a small gap between current practice and evidence (5 projects), and a lack of evidence (2 projects).

4. Discussion

In our study, we employed the i-PARIHS framework to guide an organizational-level EBP-facilitation approach that used an EBP group-based and project-oriented strategy to improve evidence-based practice among nurses in a tertiary general hospital. The results of the first survey indicated that the EBP group members generally viewed EBP positively and had higher knowledge/skills, and practice levels than did general nurses. The baseline of the two groups differed, but

the results indicated that the EBP group members had higher skills and a better attitude. The use of intermittent training of EBP, similar to a 30-hour EBP training intervention, was effective in improving the knowledge, attitude, practice, and competency of EBP among nurse educators [30]. The results of the second survey showed that the knowledge, attitudes, and practice of the EBP group members had an upward trend. A systematic review showed that the most frequent types of knowledge transition interventions implemented were educational and interactive, which were more effective than was didactic (Forsetlund et al., 2009; [12]). In our study, the interaction within the group during the implementation of the project as well as between the teachers (external facilitators) and students (EBP group members) explained the large effect in regard to improving knowledge, attitudes, and the practice level of nurses.

The i-PARIHS framework offers a structured approach for the implementation of EBP, allowing researchers to systematically consider all key factors that influence implementation, including evidence, context, and facilitation. In our EBP-facilitating strategy, the composition of the EBP group, roles of internal and external facilitators, and annual audit of EBP projects were the key components.

Lack of academic preparation is one of the barriers to EBP; appropriate composition of and training courses for groups, however, can address this barrier. Nurses with a master's degree had a better understanding of EBP and the associated skills and were able to help retrieve and synthesize the evidence that is the basis of the project. This is the reason that we utilized a high percentage of nurses with a master's degree in the groups. The leader of the group is crucial during the project; thus, a head nurse or supervisor was appointed as the leader because such an individual possesses the type of leadership that enables successful implementation. A nurse manager (head nurse or supervisor) has a particularly influential role in the implementation of EBP in terms of providing a supportive culture and environment [31–33]. The lack of sufficient leadership during evidence implementation can lead to failure, which is what occurred in five projects.

The role of facilitation in the process of implementation is a key factor in enabling the successful implementation of our EBP-facilitating strategy. The core team of the nursing department worked as internal facilitators, making the process smoother by motivating the EBP groups and continuously monitoring the process of the EBP projects. External facilitators were outside experts who brought specialized knowledge and a fresh perspective. As internal resources were insufficient for EBP, these external facilitators trained internal ones and provided ongoing systematic training and guidance during each project.

The ongoing projects, conducted each year, motivated EBP group members to use research evidence and change nursing practice. As noted in the second survey, a prominent upward trend was observed in the knowledge, attitudes, and practices of EBP group members. Despite 18 projects that failed to effectuate a change in practice, members of the EBP group acquired valuable experience, contributing to their growth in the domain of evidence-based practice. Of the projects undertaken, 33 demonstrated significant

TABLE 3: Comparison of nurses' EBP knowledge/skills, attitudes, and practice (mean \pm SD).

Group	<i>n</i>	Knowledge/skills	Attitudes	Practice	Total
EBP members	40	4.31 \pm 0.99	5.38 \pm 0.90	4.20 \pm 1.014	4.46 \pm 0.92
General nurses	152	3.85 \pm 0.75	4.64 \pm 1.00	3.84 \pm 0.91	4.02 \pm 0.69
<i>t</i> value		2.745	4.185	2.115	3.769
<i>p</i> value		0.008	<0.001	0.036	<0.001
EBP members (T1)	40	4.31 \pm 0.99	5.38 \pm 0.90	4.20 \pm 1.14	4.46 \pm 0.92
EBP members (T2)	48	4.74 \pm 0.97	5.80 \pm 0.81	4.96 \pm 1.21	4.97 \pm 0.89
<i>t</i> value		-2.072	-2.299	-3.010	-2.649
<i>p</i> value		0.041	0.024	0.003	0.010

improvements in nursing practice. These enhancements included modifications to nursing procedures, advancement of tools, development of nursing standards, and enhancement of patient outcomes. This is in keeping with the primary objective of this study, as evidenced by these EBP projects, which was to augment the efficacy of our EBP-facilitation strategy.

4.1. Limitations. The main limitation of this study was that the design was a one-arm study, with the lack of a comparison study to evaluate the effect of this group-based and project-oriented EBP strategy. Nevertheless, we observed the effect of the strategy from a longitudinal perspective (over six years) and found the strategy suitable for the culture and characteristics of our hospital. Moreover, the strategy can be applied to similar settings. Finally, had we assessed the knowledge, attitudes, and practice of the nurses each year, our findings would have been more rigorous.

5. Conclusion

Earlier research typically focused on one targeted clinical problem or on changing nursing behavior, with limited focus on knowledge translation interventions or strategy from an organizational perspective. We developed a group-based and project-oriented EBP strategy, under the guidance of the i-PARIHS framework that can promote the knowledge and attitudes of nurses and increase their level of practice, thus improving patients' outcomes. The composition of the EBP group, annual audits of EBP projects, and the roles of internal and external facilitators were key components of this EBP-facilitating program.

6. Implications for Nursing Managers

Enhancing EBP among nurses in general hospitals is critical to nursing quality, but there are still shortfalls in practice, especially in under-resourced countries. The i-PARIHS framework provides a theoretical framework for the development of an organizational-level EBP-facilitation approach based on the context of the organization. This enriches the application of the i-PARIHS framework. An EBP group-based and project-oriented strategy can improve certain nurses' academic preparation for EBP through ongoing training and sustained EBP behavior that involves annual projects. Nursing research should continue to analyze the results of projects and the characteristics of EBP behavior to promote EBP.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Ethical Approval

This study was approved by the Ethics Committee of the Second Affiliated Hospital of Zhejiang University School of Medicine (no. 2019-407).

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Review Article

Facilitating Utilization of Evidence-Informed Management by Nurse Managers in Healthcare Facilities: An Integrative Literature Review

Diane Roobasoundhrie Chetty ¹, Wilma ten Ham-Baloyi ¹, Dalena R. M. van Rooyen ², Allison Herlene Du Plessis ¹ and Joanne Naidoo ¹

¹Department of Nursing Science, Faculty of Health Sciences, Nelson Mandela University, Gqeberha, South Africa

²Faculty of Health Sciences, Nelson Mandela University, Gqeberha, South Africa

Correspondence should be addressed to Wilma ten Ham-Baloyi; wilma.tenham-baloyi@mandela.ac.za

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Background and Objectives. The scarce empirical and scientific information concerning evidence-informed management reports various benefits for nurse managers, including reduced staff turnover, enhanced working environments, and improved patient outcomes and policy implementation. This review summarizes best available evidence on facilitating utilization of evidence-informed management practices by nurse managers in healthcare facilities. The review could assist in a comprehensive overview of determinants that could assist nurse managers' successful utilization of evidence-informed management. **Methods.** An integrative review of the literature was conducted, including peer-reviewed articles published between 2010 and 2022. The databases used were BioMed Central, CINAHL Complete, MEDLINE Complete, PubMed (via EBSCOhost), the Complimentary Index (Taylor and Francis, Elsevier, Wiley, and Springer), Sabinet, ScienceDirect, and Scopus, followed by a manual search using Google Scholar and a citation search. Johns Hopkins Nursing Evidence-based Practice Research and non-Research evidence tools were used for appraisal. Thematic analysis was used to synthesize the extracted data. **Results.** Based on thirteen determinants influencing nurse managers' utilization of evidence-informed management practices, three themes were identified from a total of thirteen relevant studies: (1) Nurse manager determinants in utilization of evidence-informed management (Microlevel); (2) Organizational determinants in utilization of evidence-informed management (Mesolevel); (3) External stakeholders and context determinants of utilization of evidence-informed management practices (Macrolevel). **Conclusion.** The themes were found to be interconnected and interdependent, facilitating the effective utilization of evidence-informed management by nurse managers at micro-, meso-, and macrolevels, but highlight the need for strengthening health systems and support. Future studies are required to provide a more comprehensive understanding of the determinants influencing nurse managers' utilization of evidence-informed management practices. **Implications for Nursing Management.** For nurse managers to optimally utilize evidence-informed management, executive management and policymakers require to provide resources and support such as continuous education, incentives, effective communication, funding structures, and ownership.

1. Introduction

Evidence-informed management, also known as evidence-based management, is a prominent approach in management and public health [1, 2]. It involves systematically utilizing the best available evidence to inform decision making, improve management practices in patient care and

nursing staff supervision, and achieve desirable organizational outcomes [3, 4]. "Evidence" encompasses data from research and non-research sources such as professional experience, feedback, and organizational information [5]. While "evidence-based management" tends to emphasize empirical evidence, "evidence-informed management" allows greater flexibility [6, 7]. Nurse managers, or middle

managers, play a crucial role in initiating, guiding, and sustaining evidence-informed management practices [8–10]. Utilizing evidence-informed management leads to reduced bias, improved efficiency, better patient outcomes, and strategic planning support [9–11]. Failure to employ evidence-informed management can result in ineffective decision making, increased costs, reduced productivity, and negative effects on patient satisfaction and organizational reputation [12].

Enhancing the utilization of evidence-informed management practices among nurse managers is crucial for optimizing clinical and organizational advantages [13]. Understanding the facilitators in complex healthcare environments is essential [1], yet its application in nurse management remains novel [10]. Additionally, there is a scarcity of empirical information on evidence-informed management in relation to nurse managers, posing limitations to understanding its uptake and utilization [14, 15], potentially leading to ineffective practices and policy implementation [12, 16].

Moreover, a gap exists in integrative literature reviews conducted in English on this topic, underscoring the need for a comprehensive review [17]. Such a review could offer insights into strategies and interventions for nurse managers to utilize evidence-informed management effectively, thereby enhancing management practices and improving nursing and patient outcomes.

Thus, the objective of this review is to summarize best available evidence on facilitating utilization of evidence-informed management by nurse managers in healthcare facilities. The review question guiding the review was: “What is the best evidence available regarding the facilitation of utilizing evidence-informed management by nurse managers in healthcare facilities?”

2. Materials and Methods

The review was conducted according to Whittemore and Knaff’s [18] stages for an integrative literature review. These stages include problem identification, searching, selecting, appraising, analysing and synthesizing, and presenting the data.

2.1. Search and Selection. With the assistance of the faculty librarian, a comprehensive search was conducted in November and December 2022. The following electronic databases were searched: BioMed Central, as well as CINAHL Complete, MEDLINE Complete, and PubMed (via EBS-COhost), the Complimentary Index (Taylor and Francis, Elsevier, Wiley, and Springer), Sabinet, ScienceDirect, and Scopus. Thereafter, a manual search for grey literature using Google Scholar and a citation search were completed. Databases were chosen in consultation with the faculty librarian, adhering to recommendations by Bramer et al. [19] for systematic review searches, ensuring retrieval of the most relevant scientific data. The following key search terms and/or phrases were used: “evidence-informed management” OR “evidence-based management” AND “Nurse Manager”

AND “utilization” OR “facilitation” AND “healthcare” OR “health facility.” Boolean operators assisted in further filtering the search. Key search terms were selected in consultation with the faculty librarian, in accordance with the PICO elements. The PICO elements included P (opulation): nurse manager, I (ntervention): evidence-informed management, C (ontext): health-care facility or context, and O (utcome): facilitating the utilization of the intervention (evidence-informed management), focussing on the “process” as an outcome as compared to improved management practices, nursing and patient outcomes. The Boolean operator “OR” and “AND” was used to combine these search terms with different syntaxes adapted to each database. Screening was done according to the following eligibility criteria as outlined in Figure 1.

After deduplication, titles and abstracts of all documents and full texts obtained were screened for relevance by D.R.C. and J.N. independently, using the inclusion and exclusion criteria. The researcher initially exported records to EndNote version X9 and thereafter recorded and tracked articles in Microsoft Excel. Each step used in the searching and selecting processes is illustrated in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram [20].

2.1.1. Critical Appraisal. After data reduction through the screening for relevance was finalized, critical appraisal using the Johns Hopkins Nursing Evidence-based Practice Research (for studies with Level I, II, and III evidence) and non-Research evidence appraisal tools (for literature with Level IV and V evidence) was undertaken by D.R.C. and J.N. independently. These tools are generic tools that present a structured approach to appraising studies that present evidence of different strengths and quality using a widely established quality grading scale of high, good, and low quality [21]. D.R.C. created an Excel spreadsheet and compiled a list of the articles for review, which was sent to the independent reviewer (J.N.) with an electronic fillable Word document of the applicable appraisal tools. For studies with Level I, II, and III evidence, the items related to the strength of the study design, study results, and study conclusions were answered by clicking “yes” or “no” and comments were made on the pertinent study findings and recommendations. For literature with Level IV and V evidence, similarly, the items pertaining to the type of evidence were completed by clicking “yes” or “no” and comments were made on the pertinent study findings and recommendations. In addition, literature was graded. Only literature that met the *High* (A quality evidence) and *Good* (B quality evidence) quality grading scale according to Dang and Dearholt [21] was included for data extraction. High quality evidence included studies with rigorous designs that produced consistent, generalizable results (quantitative) or those studied that included measures of trustworthiness (qualitative) or were scientific/expert opinion papers or literature reviews. Good quality evidence included studies with reasonable designs and results (quantitative), and those that included some measures of trustworthiness (qualitative) or were credible expertise

<p>Inclusion criteria:</p> <p>Literature:</p> <ul style="list-style-type: none"> • on all levels of evidence, including Level I – Randomised controlled studies (RCTs), meta-analysis of multiple RCTs; Level II – Quasi-experimental studies; Level III- Non-experimental studies; Level IV- Clinical guidelines; Level V- Opinion papers, allowing for a comprehensive summary of the literature, as recommended by Elsbach and van Knippenberg (2020). • published in the English language- the language the authors are proficient in and to avoid translation costs, • from January 2010 to December 2022 -to obtain the latest evidence, • relating to: <ul style="list-style-type: none"> o facilitating nurse managers’ (middle managers, who are senior registered nurses or midwives who assume strategic, functional and operational responsibility and accountability for a single or multiple patient care unit(s) or nursing work group (Case Management, Nursing Education and Research, Nursing Informatics) and provide clinical and managerial supervision for three or more staff (Cox, 2019))use of evidence-informed management in healthcare management and healthcare facilities, o factors contributing to nurse managers’ utilization of evidence-informed management, o interventions and on models of evidence-informed management. <p>Exclusion criteria:</p> <p>Literature:</p> <ul style="list-style-type: none"> • related to evidence-based practice in clinical management, • related to senior executive healthcare managers and • on evidence-informed management outside healthcare management and facilities.

FIGURE 1: Eligibility criteria.

papers (opinion papers and literature reviews) [21]. A briefing meeting was held between D.R.C., J.N., and W.T.H.B. to discuss the compiled list of articles for review, the appraisal tools, timelines for review completion, follow-up, and consensus meetings where critical appraisal outcomes (number of “yes” or “no” answers, and grading) were compared between reviewers and discussed—second and third meetings. W.T.H.B.’s role was to overview the process of critical appraisal and act as consultant when there were discrepancies between the two reviewers.

2.1.2. Data Synthesis. After the critical appraisal, the data from included articles were manually extracted by D.R.C. using a self-developed data extraction tool (Excel spreadsheet), as suggested by Lubbe et al. [22]. The data extraction tool included the reference, aim and setting of the study and summary of the study findings, recommendations, and implication(s) for practice (see supplementary file (available here) for the data extraction table). D.R.C. and J.N.

independently utilized a content analysis approach to analyse the data. This approach included reading and re-reading the extracted summarized findings and recommendations as well as the implication(s) for practice from the spreadsheet, assigning codes using an additional column, which were grouped in terms of commonalities (e.g., the phrase “Belief in the evidence is important for evidence-informed management implementation” was grouped under the code “Nurse managers’ attitude and behaviour towards evidence-informed management”) [18, 22]. The final code book was derived through verification of both sets of grouped codes. Grouped codes were synthesized by re-categorization under broad headings, with the aim of deriving themes (three themes outlining the various determinants). For example, the grouped code “Nurse managers’ attitude and behaviour towards evidence-informed management” was categorized as one of the nurse manager determinants in utilization of evidence-informed management—Theme One. Any disagreements were resolved through consensus discussions between the authors.

2.2. Data Presentation. The developed themes were presented in a sequential order, starting with those that had the most supporting evidence and concluding with themes that had comparatively less supportive evidence. The level or strength of the evidence was also described for each theme. Data were reported as a narrative, supported by tables and figures.

2.3. Rigor of the Review. Overall quality and rigor of the review process were maintained using the structured process and steps articulated by Whitemore and Knafl [18]. Several steps were taken to mitigate bias and ensure rigor during the review process. In terms of the search, this was conducted by a team of researchers, including an experienced librarian; a thorough search strategy was used with carefully selected keywords and databases and the search was recorded using the PRISMA, as recommended by Batten and Brackett [23]. For the screening and data extraction processes, two reviewers independently screened the literature for inclusion in the study. Furthermore, the use of credible critical appraisal tools, using an independent reviewer, and use of a data extraction form in the form of a spreadsheet enhanced rigor [24, 25]. Finally, the transparent documentation of each step of the review process enhanced replicability of the process [26].

3. Results

3.1. Search and Selection Results. A total of two hundred and ninety-six ($n = 296$) articles were identified from searching the electronic databases. After deduplication and screening titles and abstracts, $n = 41$ articles were retained. The manual search and citation search yielded an additional three articles. A total of $n = 44$ full-text articles were screened for possible inclusion in the selection, leading to the exclusion of $n = 29$ articles and a further exclusion of two ($n = 2$) articles after critical appraisal. Thirteen articles met the inclusion criteria and were therefore included in the review (see Figure 2).

3.2. Quality of Evidence. Most studies ($n = 11$) were non-experimental research, including qualitative ($n = 6$), quantitative ($n = 4$), and mixed method ($n = 1$) designs, offering Level III evidence with *Good* (B) quality rating. The remaining two studies ($n = 2$) were non-research studies with Level V evidence and a quality rating of *Good* (B) [21]. The level of evidence and quality rating for all themes and related determinants were III(B), V(B).

3.3. Country. The studies were conducted in different countries, namely, Iran ($n = 4$), the United States of America ($n = 3$), Canada ($n = 2$), Australia ($n = 1$), Lebanon ($n = 1$), Pan-European ($n = 1$), and Scotland ($n = 1$).

3.4. Healthcare Context. Given the variety of countries in which the studies were conducted, the review of the healthcare contexts indicated diverse multicultural settings with varying socioeconomic and facility ownership policies. Contexts included rural, regional, and urban hospitals.

3.5. Determinants and Themes. Following the synthesis, thirteen ($n = 13$) determinants that were reported as facilitators and barriers to nurse managers' evidence-informed management utilization were identified. These determinants pointed to influences at different levels of the healthcare system—that is, the micro- (nurse manager level), meso- (organization level), and macro- (external) levels. The determinants were categorized under three main themes (see Table 1).

A comprehensive discussion of the themes and sub-themes is presented in the following section.

3.5.1. Theme One: Nurse Manager Determinants in Utilization of Evidence-Informed Management (Microlevel). At the individual nurse manager level within the healthcare system, there is a significant expectation and responsibility to effectively use evidence in management practice [13, 17]. Thirteen studies identified five determinants for nurse managers' utilization of evidence-informed management: appropriate training and competencies ($n = 13$), acting as knowledge brokers ($n = 12$), attitudes and behaviours ($n = 11$), experience and education level ($n = 10$), and availability of supportive tools ($n = 7$) (see Figure 3).

3.5.2. Determinant 1: Nurse Managers' Training, Knowledge, Skills, and Competencies. To enhance the utilization of evidence-informed management by nurse managers, ongoing education in skills such as evidence searching, appraisal, interpretation, and application is essential. This education should complement formal training through workshops and reading reports. Creating a supportive learning environment, fostered by peer coaching, mentoring, and exposure to evidence-utilization situations, further enhances nurse managers' capacity [1, 2, 13, 17, 27–32, 34].

3.5.3. Determinant 2: Nurse Manager as Knowledge Broker. Nurse managers, as middle managers, play a pivotal role as information hubs within healthcare settings, bridging the gap between various stakeholders by gathering, translating, and disseminating information. This knowledge brokering function facilitates change and enhances the integration of knowledge into practice. Achieving this role effectively necessitates flattened hierarchical structures, empowering nurse managers with the autonomy and authority to make informed decisions [34, 35].

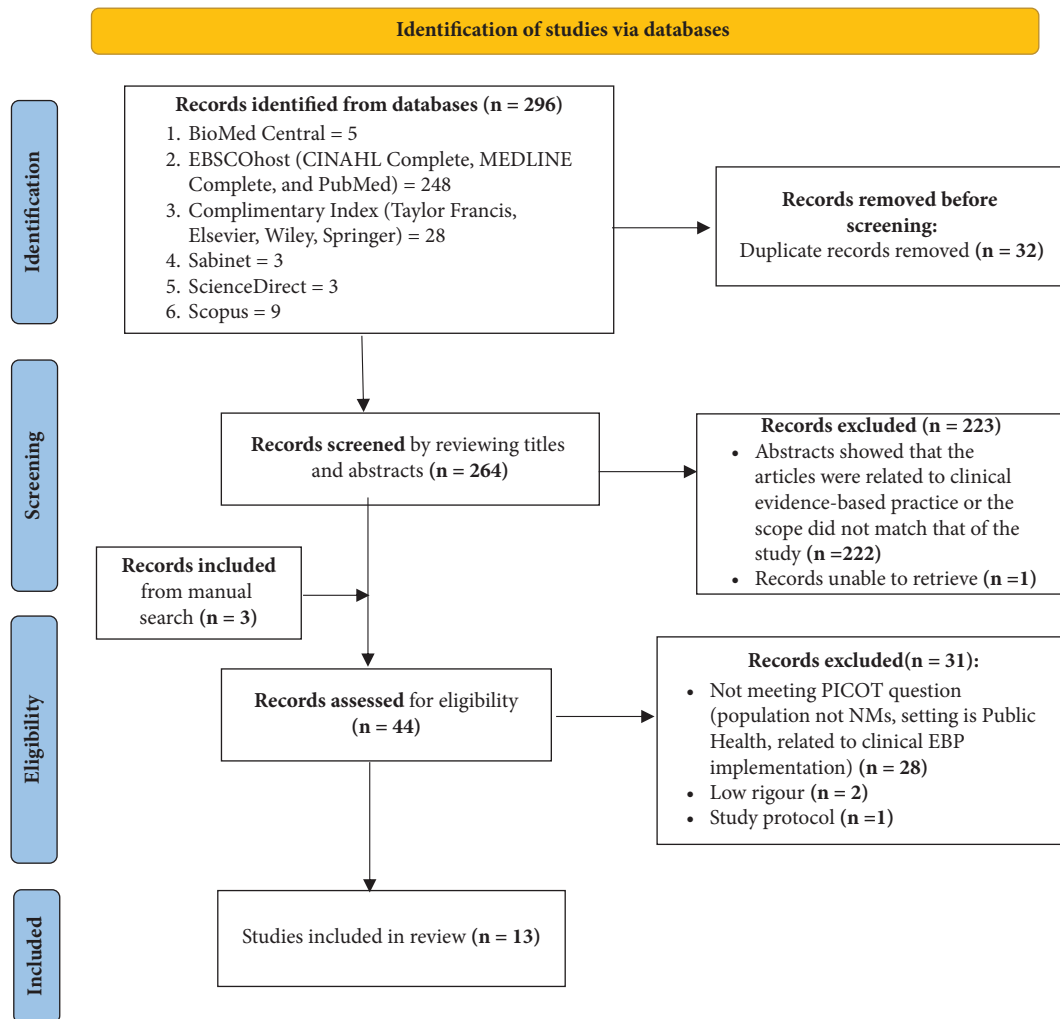


FIGURE 2: Flow diagram to illustrate data evaluation and reduction (adapted after [20]).

3.5.4. Determinant 3: Nurse Managers' Attitude and Behaviour towards Evidence-Informed Management. Nurse managers demonstrate positive attitudes and behaviours towards evidence-informed management by showing enthusiasm, motivation, and openness to innovation, along with utilizing performance data to inform decisions. Improving these attitudes and behaviours can be achieved through incentives, adequate resource provision, funding for innovation, and effective communication from senior management. Establishing policies, facilitating shared governance, and enhancing participation in decision making further support this culture [1, 2, 13, 17, 32–35].

3.5.5. Determinant 4: Nurse Manager Experience and Level of Education. Nurse managers with a Bachelor level of education were reported to be positively associated with promoting principles of quality [28]. However, Hasanpoor et al. [13, 17] found no correlation between level of education and experience of using evidence in management practice.

3.5.6. Determinant 5: Tools to Support Evidence-Informed Management Utilization. The synthesized data indicated five ($n=5$) tools the nurse manager can use to support evidence-informed management utilization (see Table 2).

3.5.7. Theme Two: Organizational Determinants in Utilization of Evidence-Informed Management (Mesolevel). The 13 included studies identified six organizational determinants (determinants 6–11) influencing evidence-informed management at a mesolevel: (1) robust organizational structures ($n=13$), (2) adequate and accessible resources ($n=13$), (3) supportive and learning culture ($n=12$), (4) information and technology ($n=12$), (5) positive leadership attitude and behaviours ($n=9$), and (6) ownership and funding structures ($n=4$) (Figure 4).

3.5.8. Determinant 6: Robust Organizational Structures. Organizational contexts necessitate the establishment of infrastructure encompassing systems, processes, and

TABLE 1: Determinants for facilitating nurse managers' utilization of evidence-informed management.

Themes	Nurse manager determinants in utilization of evidence-informed management (microlevel) <i>n</i> = 5										Organizational determinants in utilization of evidence-informed management (microlevel) <i>n</i> = 6			External stakeholders and context determinants of evidence-informed management utilization (macrolevel) <i>n</i> = 2		
	level of evidence-III(B), V (B)										level of evidence-III(B), V(B)			level of evidence-III(B), V(B)		
References (n = 13)	Nurse managers' training, knowledge, skill, and competencies	Nurse manager as knowledge broker	Nurse managers' attitude and behaviour towards evidence-informed management	Nurse managers' experience and level of education	Tools to support evidence-informed management utilization	Robust organizational structures	Adequate and accessible resources	A supportive and learning culture	Information and technology	Positive leadership attitude and behaviours	Ownership and funding structures	External stakeholders	Socioeconomic, political, and ethical context			
[27]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[28]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[29]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[30]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[1]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[17]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[13]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[31]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[32]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[2]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[33]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[34]	x	x	x	x	x	x	x	x	x	x	x	x	x			
[35]	x	x	x	x	x	x	x	x	x	x	x	x	x			
Total	<i>n</i> = 13	<i>n</i> = 12	<i>n</i> = 11	<i>n</i> = 10	<i>n</i> = 7	<i>n</i> = 13	<i>n</i> = 13	<i>n</i> = 12	<i>n</i> = 12	<i>n</i> = 9	<i>n</i> = 4	<i>n</i> = 11	<i>n</i> = 8			

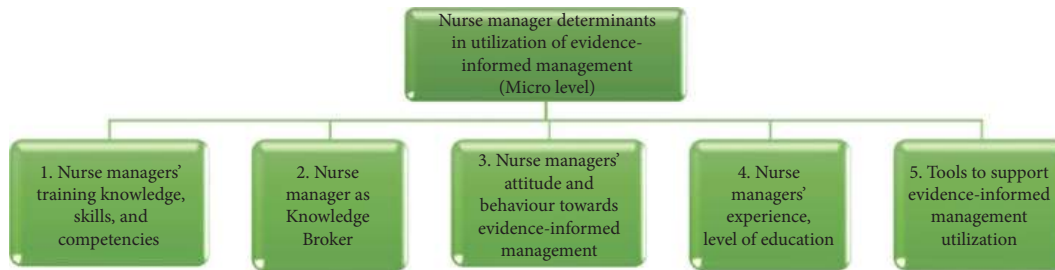


FIGURE 3: Nurse manager determinants (theme one).

structures to carry out the organization's mission in an evidence-informed manner [2, 32]. Robust organizational structures, characterized by a flattened hierarchy and open information flow, facilitate evidence-informed management. These structures, including networking structures for communication and collaboration within and external to the organization, enhance nurse managers' exposure to diverse information sources. They also facilitate engagement in peer-to-peer dialogue with university colleagues, thus strengthening knowledge brokering [13, 17, 31, 33].

3.5.9. Determinant 7: Adequate and Accessible Resources. Evidence-informed management necessitates investment in resources, including research teams, data analysts, and dedicated planning time. Supportive teams and adequate human resources, such as associate nurse managers or clerical support, are crucial to alleviate non-managerial tasks, enabling nurse managers to focus on evidence-informed management [13, 17, 27, 29, 30, 32, 33].

3.5.10. Determinant 8: A Supportive and Learning Culture. A supportive learning culture, essential for evidence-informed management, prioritizes staff development and infrastructure building [2]. This culture necessitates transparent communication on organizational priorities, staff participation, compensation systems, and feedback mechanisms. Accessible education and training programs on performance data usage, along with quality improvement tools, are vital for planning and knowledge translation [13, 17, 31, 32].

3.5.11. Determinant 9: Information and Technology. Organizations can support nurse managers' performance measurement through various resources, such as dashboards and wearable communication devices, aiming to improve efficiency, quality, and patient safety, thus promoting evidence-informed management [12, 13, 17, 30, 32]. Training nurse managers to utilize advanced data interpretation skills, including control and run charts, enhances their ability to utilize available information and technology effectively [12, 13, 17, 32].

3.5.12. Determinant 10: Positive Leadership Attitude and Behaviours. Leaders should embrace suggestions from nurse managers and model evidence-based behaviours, coaching them to do the same and shifting from a crisis management culture [2, 33].

3.5.13. Determinant 11: Ownership and Funding Structures. Ownership of an organization, whether government or private, significantly influences operations at the mesolevel, including the adoption of evidence-informed management. Private for-profit institutions often exhibit greater motivation for evidence use due to financial targets, whereas public institutions may lack such incentives [13, 32]. In low- to middle-income countries, limited resources, inadequate innovation, and a lack of incentivized programs hinder evidence-informed management. These challenges lead to reduced health expenditure, hampered networking, and limited communication and collaboration, particularly in rural areas [27].

3.5.14. Theme Three: The External Stakeholders and Context Determinants of Evidence-Informed Management Utilization (Macrolevel). At the macrolevel, two determinants (determinants 12 and 13) influencing evidence-informed management utilization were identified: (1) external stakeholders ($n=11$) and (2) context (socioeconomic, political, and ethical) ($n=8$) (see Figure 5).

3.5.15. Determinant 12: External Stakeholders. External stakeholders impacting nurse managers' use of evidence-informed management include regulatory bodies mandating performance data submission and setting performance targets [32]. Nurse managers are tasked with measuring this information and achieving the set targets.

3.5.16. Determinant 13: Socioeconomic, Political, and Ethical Context. Strong policies and discourses from the macrolevel external environment, particularly in socioeconomic and political domains, permeate organizational infrastructure at the mesolevel, significantly impacting individual nurse managers' utilization of evidence-informed management at

TABLE 2: Tools to support evidence-informed management utilization.

Type of tool	Title and source	Description
Models ($n = 3$)	Decision-making dependency model [27]	<p>Eight factors influence the decision-making process:</p> <ul style="list-style-type: none"> (a) Situation addressed; (b) Time constraints; (c) Input from colleagues; (d) Task and environmental complexity; (e) Decision duration; (f) Resource availability; (g) Decision-making environment; and (h) Personal characteristics
	Evidence-based management model [1, 13, 17]	Understanding evidence-informed management for implementing evidence-based practices in healthcare
	Evidence-based practice model [36]	Focuses on elucidating nurse managers' challenges in implementing evidence-based practice, emphasizing practice change and incorporating research and contextual factors
Decision-making tools ($n = 1$)	Dynamic network analysis decision support tool (DyNADs) [29, 30]	Utilizing computer modelling and simulations to assess the feasibility of innovations within a unit, based on nurse managers' cognitive work analysis. Allows for multilevel, multidimensional testing of interventions, individually or in combination
Framework ($n = 1$)	Framework of facilitators and barriers of evidence-based management [2]	Focuses on identifying facilitators and barriers of evidence-based management

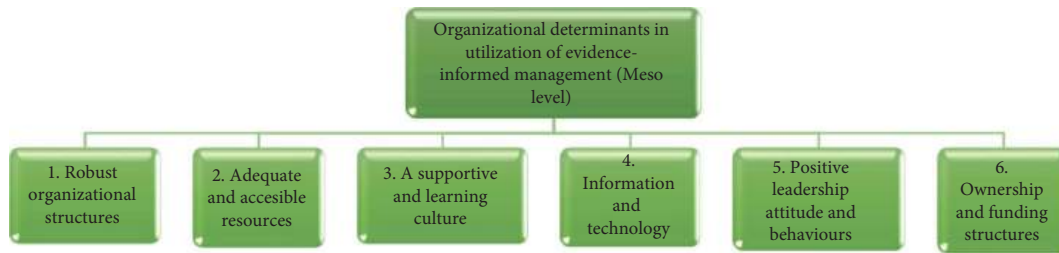


FIGURE 4: Organizational determinants (theme two).

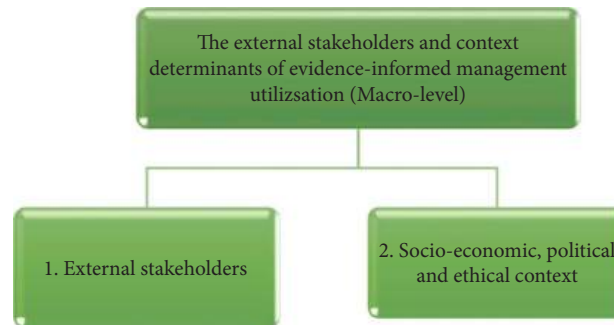


FIGURE 5: External stakeholders and context determinants (theme three).

the microlevel. This influence extends through national politics, policy, and socioeconomic reform. Furthermore, ethical influences from government and agency regulations shape access to care and resource allocation through policies and processes [27].

4. Discussion

This review aimed to provide a comprehensive synthesis of the most reliable and up-to-date evidence regarding the facilitation of evidence-informed management utilization by nurse managers within healthcare facilities. Through an exhaustive analysis, a total of 13 determinants were identified which significantly influence the utilization of evidence-informed management by nurse managers. These determinants were further categorized into three overarching themes related to the utilization of evidence-informed management: (1) Nurse manager determinants at the microlevel (five determinants); (2) Organizational determinants (six determinants); and (3) External stakeholders and the broader context at the macrolevel (two determinants). It is important to note that despite operating at the microlevel within the organization, nurse managers are influenced by factors at the meso- and macrolevels, emphasizing the significance of considering determinants at all three levels to foster effective utilization of evidence-informed management. Hence, nurse managers should consider the influences from multiple levels to ensure successful utilization of evidence-informed management [37].

At microlevel, the development of nurse managers' knowledge, skills, and competencies in terms of accessing, appraising, and applying evidence in their decision-making processes is essential for effective use of evidence-informed

management. This notion is consistent with recommendations made in other studies [38, 39]. Strengthening nurse managers' knowledge, skills, and competencies in evidence-informed management is particularly critical, as a lack of competencies has been reported a common barrier to establishing a culture that supports evidence-informed practices [39, 40]. To enhance nurse managers' competencies, various strategies should be employed and supported by the executive management of a health organization. These include formal education through structured educational programs and ongoing professional development through web-based platforms and online educational resources, all of which should be aimed at enhancing nurse managers' competence and skills in utilizing evidence-informed management in decision-making processes, for example, through training in critical appraisal [39, 41]. Furthermore, access to reliable sources of evidence, such as databases, journals, and research articles, equips nurse managers with the necessary information to make informed decisions while assisting them to gain autonomy to be Knowledge Brokers. In addition, the education pertaining to evidence-based management, whether provided in a formal or informal setting, should also include the utilization of supportive tools identified in our review—including frameworks, models, and decision-making tools.

However, it is important to note that competence in utilizing evidence-informed management may not be sufficient on its own but requires a change in positive attitudes and behaviours. Our review revealed that nurse managers' positive attitudes and behaviours towards evidence-informed management are crucial determinants of utilization, as they encourage them to question prevailing practices. We identified in existing literature several strategies in our review that can enhance nurse managers' attitudes and

behaviours towards evidence-informed management, including incentives such as incorporating evidence-informed management competencies into performance evaluation criteria, providing access to adequate human and monetary resources, effective communication that fosters shared governance among nurse managers, and participation in decision-making processes [42]. However, it should be noted that these strategies primarily address extrinsic factors influencing behaviour, while there is limited understanding of the intrinsic factors that drive behaviour towards evidence-informed management utilization, necessitating further exploration in this area. Furthermore, although most nurse manager determinants are largely influenceable by the nurse manager, the findings of our review indicate that the cultivation of an effective Knowledge Broker role (determinant 2) necessitates the presence of flattened hierarchies within organizational structures. Such hierarchical flattening serves as a facilitator for the dissemination and utilization of pertinent evidence. Moreover, this process is not solely contingent upon the influence exerted by nurse managers; rather, it is contingent upon the establishment of a corporate culture characterized by flexibility, egalitarianism, and transparent communication in its approach to evidence-informed management and its paradigms [43].

At mesolevel, our review highlights the significance of organizational determinants in facilitating nurse managers' utilization of evidence-informed management. Organizational determinants are particularly important since they play a crucial role in organizational change and influence evidence-based organizational practices [39, 44]. We identified several key elements of the organizational context that contribute to this utilization, including robust organizational structures, ownership and funding mechanisms, and the availability of adequate and accessible resources, such as information and technology. Furthermore, a supportive and learning culture characterized by positive leadership attitudes and behaviours was found to be crucial, which aligns with findings from other studies [45, 46]. However, it is worth noting that further exploration is needed regarding the determinants concerning the role of ownership and funding structures, as only a limited number of studies supported the relevance of this determinant in the context of nurse managers' utilization of evidence-informed management. Our review has highlighted the impediments posed by resource-constrained environments to the effective utilization of evidence-informed management. However, it is notable that the dearth of studies addressing this specific context within our review limits a comprehensive understanding of the challenges and strategies pertinent to evidence-informed management utilization in such settings. Moreover, the scarcity of innovative and cost-effective interventions aimed at bolstering the adoption of evidence-informed management underscores the necessity for further inquiry and exploration in this domain [47].

At macrolevel, our review revealed that external stakeholders and the broader socioeconomic, political, and ethical context exert indirect effects on nurse managers' utilization of evidence-informed management. For instance, the functioning of a healthcare facility or organization within

a larger health system that benefits from a favourable socioeconomic environment, such as sufficient funding, a supportive political landscape with policies promoting innovation and leadership, and an ethical context encompassing appropriate legal systems like auditing and health ombudsman, can facilitate the provision of an enabling organizational context for nurse managers. This finding is consistent with previous research [48] that emphasizes the interplay between the macrolevel context and the capacity-building of nurse managers. Consequently, it is crucial to strengthen healthcare systems by developing the capacity to effectively utilize data to measure the impact of interventions, thereby enhancing the utilization of evidence-informed management. This, in turn, leads to improvements in cost-effectiveness and patient outcomes [49]. Once more, it is important to note that the health system strengthening is not solely contingent upon the actions of nurse managers. Nonetheless, the involvement and input of nurse managers are imperative in facilitating their ability to effectively leverage the utilization of evidence-informed management. Empowering nurse managers with decision-making authority and incorporating their perspectives can contribute significantly to the successful integration of evidence-based approaches within health systems [50]. Thus, while nurse managers may not directly influence the strengthening of health systems, their engagement is essential for promoting the utilization of evidence-informed management.

In conclusion, while our review delineated determinants of evidence-informed management across micro-, meso-, and macrolevels, it is imperative to recognize that these determinants do not operate in isolation. Rather, they interact dynamically, constituting an intricate web of factors that collectively influence the utilization of evidence-informed management practices. This holistic perspective underscores the need for a comprehensive understanding of the interplay among various determinants to effectively foster evidence utilization within organizational contexts.

4.1. Limitations. This review has several limitations that should be considered when interpreting the findings. Firstly, the small number of studies related to the facilitation of utilization of evidence-informed management by nurse managers limits in-depth understanding and conclusive evidence on the topic. Secondly, the search for relevant literature was restricted to institutional databases accessible to D.R.C., which may have led to the exclusion of potentially valuable studies from other sources [19]. Thirdly, the inclusion criteria were limited to studies published in English, which may have introduced language bias and resulted in the omission of relevant studies published in other languages [51]. Fourthly, the review included mainly non-experimental studies, primarily comprising Level III evidence, which may serve to limit the strength of the conclusions drawn [21]. Additionally, most of the included studies were conducted in developed country contexts, which may restrict the generalizability of some of the findings to other, resource-constrained healthcare settings or facilities. Despite these limitations, this review can still provide valuable insights in

an underresearched topic such as evidence-informed management. However, researchers should be aware of these limitations and interpret the findings with caution.

4.2. Recommendations for Future Research. It is crucial to recognize the current limitations of published evidence in this field. There is a clear necessity for more robust research to improve the validity and generalizability of findings. This would enable the development of evidence-based strategies and interventions to better support nurse managers in effectively utilizing evidence-informed management practices. Therefore, it is recommended that further research be conducted to enhance the validity and breadth of knowledge on evidence-informed management and how its use could be facilitated among nurse managers. Future studies should employ robust research designs, notably large-scale and meticulously crafted randomized controlled trials, spanning various contexts. This is especially pertinent in resource-constrained healthcare environments where novel approaches are needed to promote the adoption of evidence-informed management practices. Such an approach promises to yield a deeper comprehension of the factors shaping the utilization of evidence-informed management by nurse managers and offer insights into strategies for enhancing its utilization and implementation.

Additionally, it is recommended to conduct a systematic review and/or meta-analysis summarizing the impact of evidence-informed management on managerial and patient care outcomes, as these aspects were not the primary focus of the current review. Synthesizing existing evidence in this manner could provide valuable insights into the broader implications of evidence-informed management practices.

Finally, the studies encompassed within this review notably abstained from delineating precise adaptations or modifications in the utilization of evidence-informed management practices by middle managers amid the pandemic. Such a delineation was not explicitly within the purview of this review. However, it warrants consideration whether there exists a discernible divergence or heightened efficacy attributed to the utilization of such practices amid the pandemic's needs. This assessment is particularly pertinent given the pronounced impact of the pandemic on healthcare and nursing management, and expectations for the role within these sectors.

4.3. Implications for Nursing Management. This study provides guidance to nurse managers in their work practices. The 13 identified determinants can be considered to enhance nurse managers' utilization of evidence-informed management which has the potential to influence organizational outcomes at the micro-, meso-, and macrolevels, but requires organizational support and health system strengthening. The determinants identified could be effectively integrated into daily management practices through a variety of approaches. One such approach involves benchmarking with other health facilities or organizations to strategically enhance the utilization of evidence-informed management among nurse managers. Additionally,

conducting a context analysis can provide insights into which determinants are currently in place and which ones require strengthening to facilitate the seamless integration of evidence-informed management into decision-making processes. This analysis serves as a foundation for developing one or more strategies, complete with defined goals, tasks, timeframes, task prioritization, and clear evaluation criteria [52]. Following the context analysis, the development of strategies may entail the creation of tools, such as educational resources aimed at training nurse managers on evidence-informed management principles, and dashboards designed to streamline the management and analysis of evidence and data [53]. These tools can be adapted from existing resources or developed anew and subsequently incorporated into a comprehensive toolkit to enhance the implementation of strategies prior to pilot testing. Continuous evaluation of the effectiveness of these strategies aimed at optimizing the utilization of evidence-informed management is essential. Feedback loops and the identification of emerging best practices enable the ongoing refinement and adaptation of approaches to ensure their relevance and efficacy in real-world settings [54].

5. Conclusions

This comprehensive review identified a total of 13 determinants that significantly influence the utilization of evidence-informed management by nurse managers. These determinants were organized into three overarching themes: (1) Nurse manager determinants in utilization of evidence-informed management at the microlevel, (2) Organizational determinants in utilization of evidence-informed management at the mesolevel, and (3) External stakeholders and context determinants of utilization of evidence-informed management at the macrolevel. The themes were found to be interconnected and interdependent and can be used by nurse managers to optimally utilize evidence-informed management. However, the findings also highlight the need for executive management and policymakers to strengthen health systems by providing resources and support, such as education, incentives, effective communication, robust organizational structures, funding, and ownership. Future studies from various contexts are required to provide a more comprehensive understanding of the determinants influencing nurse managers' utilization of evidence-informed management practices and the use of interventions and strategies to achieve evidence-informed management.

Data Availability

Data are available on request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

One data extraction table was included. The table outlines the extracted data regarding the reference, aim of the study and country, and findings and implications for practice for each of the 13 articles. (*Supplementary Materials*)

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Review Article

Factors Associated with the Integration of Culturally and Linguistically Diverse Nurses into Healthcare Organisations: A Systematic Review of Quantitative Studies

R. Joensuu,^{1,2} K. Suleiman ,^{1,3} M. Koskenranta ,^{1,4} H. Kuivila ,¹ A. Oikarainen ,¹
J. Juntunen ,¹ Y. S. Goh ,⁵ S. Y. Liaw ,⁵ and K. Mikkonen ,^{1,6}

¹Research Unit of Health Sciences and Technology, University of Oulu, Oulu, Finland

²Department of Nursing, University of Otago, Christchurch, New Zealand

³Department of Healthcare and Social Services, JAMK University of Applied Sciences, Jyväskylä, Finland

⁴Health Care and Social Services, Vaasa University of Applied Sciences, Vaasa, Finland

⁵Alice Lee Centre for Nursing Studies, National University of Singapore, Queenstown, Singapore

⁶Medical Research Center Oulu, Oulu University Hospital and University of Oulu, Oulu, Finland

Correspondence should be addressed to K. Mikkonen; kristina.mikkonen@oulu.fi

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Background. Global nursing shortages have led to the recruitment of culturally and linguistically diverse nurses from various countries. However, nurses face integration challenges in their host countries. **Objective.** This systematic review aimed to find the most recent evidence of factors associated with integrational strategies and models to support the transition and adaptation of culturally and linguistically diverse nurses to the professional workforce in healthcare settings. **Methods.** This systematic review used the population, exposure, outcome framework to select studies according to JBI guidelines. Original peer-reviewed quantitative studies published between 2000 and 2021 were identified. Two researchers independently screened the studies based on eligibility criteria using title, abstract, and full text. The JBI critical appraisal tool assessed the methodology's quality for analytical cross-sectional studies. Data were extracted, tabulated, and analysed narratively. PRISMA checklist was used in reporting. **Data Sources.** CINAHL (Ebsco), PubMed, Medic, ERIC (ProQuest), and Scopus. **Results.** The systematic review encompassed 19 articles and identified multiple factors associated with successful integration. These factors were classified into the following six categories: sociodemographic characteristics, discrimination, social support, organisational support, workplace environment, and acculturation. **Conclusions.** Comprehensive cultural competency training for healthcare staff, including managers, enhances cultural proficiency in work environments. Clear guidelines addressing bias and discrimination create a supportive environment where culturally and linguistically diverse nurses feel valued and respected, facilitating their adaptation and integration. **Relevance to Clinical Practice.** Patient care quality can be improved by ensuring sustainable culturally and linguistically diverse nurses' integration into healthcare organisations. Cultural diversity is a unique opportunity to bring a diverse range and experience to clinical settings. The diversity can also help enhance the cultural competence of healthcare staff, allowing them to better understand and cater to the needs of culturally diverse patients. **Patient or Public Contribution.** Not required for study design.

1. Introduction

Globally, one in every eight nurses (13% = 3.7 million) were born or trained in a country other than the one in which they currently practise, and this mobility is expected to increase

[1]. Recruitment of culturally and linguistically diverse (CALD) nurses can be considered a strategy to address nursing shortages and bring diverse backgrounds, experiences, and skills that can contribute to filling the gaps in the nursing workforce [1–4]. However, it is creating new

challenges for healthcare organisations [5] and the host nurses who supervise the workplace entry of CALD nurses and assist them in integrating into the health workforce [6]. These challenges include, for example, learning a new language or technical terminology [7], differences in nursing practices and cultural values, discrimination and racism, or delays in recognition of competencies, all of which can lead to deskilling and frustration [8–10]. CALD nurses are often required to adapt and learn, while representatives of the majority population are generally not expected to change in multicultural work communities [4, 11, 12]. Moreover, working communities often have a normative requirement to adhere to established operating models whose contents may not be accustomed to negotiation. Hence, a good nurse with a foreign background has assimilated into the majority population as much as possible. In this case, support of the work community towards CALD nurses appears to be conditional; thus, if the newcomer CALD nurse is considered to be active and positive, the community may support them better [4].

Successful workplace integration is a continuous [13], complex, costly [14], and time-consuming process not only for the organisation but also for internationally trained nurses and host nurses [4, 15–18]. Integration is a two-way adaptation process or goal between the receiving society and the immigrant, as individuals and as a group, ensuring that both parties maintain their cultural identity [16, 19]. In integration, the immigrant commits and becomes accepted into the society of the destination country culturally, politically, and socioeconomically [19]. Factors in the workplace that promote the integration and permanence of CALD nurses are a practical work environment, cooperative work community, support from managers and colleagues, professional development opportunities [18, 20, 21], sociocultural support and training [20], and a desirable work-life balance [18]. Successfully integrated nurses can efficiently lead the work team in work communities, instruct colleagues, and participate in developing high-quality service [13, 17]. On the other hand, the lack of support for integration can cause weakened self-esteem, the feeling of being an outsider, shame, anxiety caused by a different culture, and isolation among immigrant nurses [11, 13].

The factors associated with integration into a different healthcare setting have been shown to impact CALD nurses' personal and professional outcomes significantly [13], patients and their families [22], and thus, the efficiency and profitability of the entire healthcare system [23]. Therefore, any strategies and models developed and implemented must adopt a multidimensional approach, considering factors associated with integrating CALD nurses. Considering these aspects, the integration process can be strengthened, leading to more positive outcomes [20, 24]. Poor workplace integration experience is intrinsically linked to high attrition rates of CALD nurses and concomitantly increasing healthcare costs while compounding existing nursing workforce shortages [25, 26].

There appears to be a lack of previous reviews of understanding the factors related to the integration strategies and models of CALD nurses and the potential for these factors to enhance outcomes during the transition of

immigrant nurses into the professional workforce. The main objective of this review is to seek the latest evidence concerning the factors related to integrational strategies and models, thereby aiming to support the transition and adaptation of CALD nurses within healthcare environments. In addition, this research emphasises the importance of establishing the standards of healthcare organisations associated with the effective integration of CALD nurses.

2. Research Aim

This systematic review sought the most recent evidence on factors associated with integrational strategies and models to support CALD nurses' transition and adaptation to the professional workforce in healthcare settings.

The following research question is addressed: which factors are associated with integrational strategies and models developed to support the transition and adaptation of CALD nurses to the professional workforce in healthcare settings?

3. Methods

3.1. Search Strategy. This systematic review was conducted following the guidelines of the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis—Systematic Review [27]. Systematic reviews aim to establish evidence by synthesising international research, and the results are used to inform practice, policy, evidence-based practice, and research. The advantages of conducting a systematic review are that the findings establish the international scope of practice, help build new practices by either affirming or putting to question current practice, and support clinical decision-making [28]. This method suited our phenomena since CALD nurse integration into healthcare is global, and findings may help improve integrational practices. After identifying the aim of the study and research question [29], participants, exposure of interest, and outcomes' (PEOs) protocol was used to formulate the review inclusion and exclusion criteria [28]. The review participants included CALD nurses from primary and specialised healthcare settings. Primary healthcare settings included general practice, primary care clinics, community health centres, emergency care, and residential older person care facilities. Specialised healthcare settings included hospitals, speciality clinics, rehabilitation centres, and mental health facilities. Students, patients, and healthcare professionals other than nurses were excluded from this study. The exposure of interest was studies that describe factors that predict or are related to integrating CALD nurses into healthcare organisations. The review searched for studies that reported outcomes of CALD nurses' models and strategies for integrating into nursing professional work in primary and specialised healthcare organisations, including orientation and education, team and atmosphere at work, competence evaluation and career development, management and leadership, mentorship, and retention. The review examined original, peer-reviewed, quantitative studies published from 2000 to 2021. The language limitation was set to Finnish and English. Grey

literature was not included. Qualitative studies were excluded from this systematic review since they did not align with the research aim.

The search terms used included synonyms of the population, exposure, outcome (PEO) framework keywords relevant to this study as inclusion criteria [27]. The Oulu University library and researchers in the subject area were consulted to ensure that appropriate databases, search terms, and keywords were included to enhance the validity of the information retrieved for this review. The search was focused on the inclusion criteria and combined with Boolean operators AND, OR, and NOT (see Supplementary File 1).

Five databases were selected to retrieve original studies for the systematic review: PubMed, CINAHL (EBSCO), ERIC (ProQuest), Scopus, and Medic. PubMed stood out for its user-friendly interface and comprehensive content coverage, leading to its selection over Ovid Medline. In addition, Medic, a Finnish health sciences reference database managed by the Helsinki University Library, was considered. It encompasses medical, dental, nursing, and associated bioscience literature alongside selected publications from other pertinent fields. Hosting about 120,000 references, it sees an annual addition of roughly 3,000 new entries, focusing on material published in Finland, irrespective of language [30].

3.1.1. Screening Process and Quality Assessment. A total of 13752 publications were retrieved from the database searches (see Figure 1). Six researchers (authors blinded) participated in the screening process. After 5301 duplicate publications were excluded, the total number of studies included was 8451. The next stage involved screening based on titles and abstracts, during which 7694 studies were excluded. Next, full-text screening of $n=757$ studies was conducted, where 737 papers that did not meet the initial inclusion criteria were eliminated. Each study underwent a double screening, and a third reviewer resolved conflicts. Twenty articles met the inclusion criteria and were subjected to a quality appraisal (see Figure 1).

For quality appraisal assessment, the JBI critical appraisal tool for analytical cross-sectional studies [32] was used to assess the methodological quality of each study ($n=20$) (see Supplementary File 2). This appraisal tool consists of eight evaluation criteria that examine the methodological quality of an article and determine the extent to which a study has addressed potential biases in its design, conduct, and analysis. Each criterion was evaluated and marked as “yes,” “no,” “unclear,” or “not applicable.” One point was assigned for each criterion rated “yes.” Six researchers (authors blinded) were involved in the quality appraisal assessment to ensure rigorous assessment. Each study underwent a double assessment separately, and disagreements were discussed and resolved through consensus. Inclusion in the review required meeting at least four of the eight requirements, with a total score of at least 50%. Low-quality studies were excluded to maintain the validity of the review’s results and recommendations.

Furthermore, 19 studies scored above 50% and were included in the data synthesis. Among these, three studies

scored 100%, six scored 75%, seven scored 62.5%, three scored 50%, and one scored 37.5% (excluded from data synthesis). Most of the articles received lower quality scores for various reasons, such as uncertainty regarding the valid and reliable measurement of exposure, lack of clear identification and strategies to address confounding factors, and uncertainty regarding the valid and reliable measurement of outcomes.

3.2. Data Extraction and Analysis. The 19 original studies selected were organised by year of publication, country of origin, purpose, methodology (study design, instruments, data collection, and data analysis), participants, and factors associated with the integration and quality assessment score [27] (Table 1). Furthermore, the studies identified and presented the factors most significantly associated with integrating CALD nurses. A narrative synthesis approach was used to synthesise the data [33]. This involved collecting all the narrative results from the selected studies, reducing the data by identifying similarities and dissimilarities, and organising similar findings into meaningful classifications.

4. Results

The factors associated with integrating CALD nurses in healthcare organisations were explored in 19 of the original studies. The original studies selected for the systematic review were published between 2008 and 2021 and conducted in the United States (US) (six reviews), United Kingdom (UK) (3), Saudi Arabia (1), Canada (2), Taiwan (4), Korea (1), and Australia (2). The designs of the selected studies were descriptive ($n=7$), cross-sectional ($n=11$), and comparative ($n=1$), and data collection methods that included survey questionnaires and electronic databases were used. The data analysis methods used were statistical parametric analysis and descriptive nonparametric analysis. Participants in the original studies were internationally recruited registered nurses from different countries working as registered nurses in the US, UK, Canada, Australia, Saudi Arabia, and Taiwan. The number of participants varied from 15 to 1951. The systematic review provided an overview of the findings from each study in terms of the factors related to the integration of CALD nurses in healthcare organisations. The data are divided into the following six categories that aimed to answer the research question: (1) sociodemographic characteristics, (2) discrimination, (3) social support, (4) workplace environment, (5) organisational support, and (6) acculturation (see Table 2). The factors influencing integration were classified based on Kamau et al.’s [20] three-dimensional model of integration models and strategies. This model incorporates professional development characteristics, intraorganisational factors, and sociocultural aspects categorised accordingly.

4.1. Factors Associated with Professional Development

4.1.1. Career and Competence Development. Statistically significant individual characteristic factors related to the career and competence development of internationally

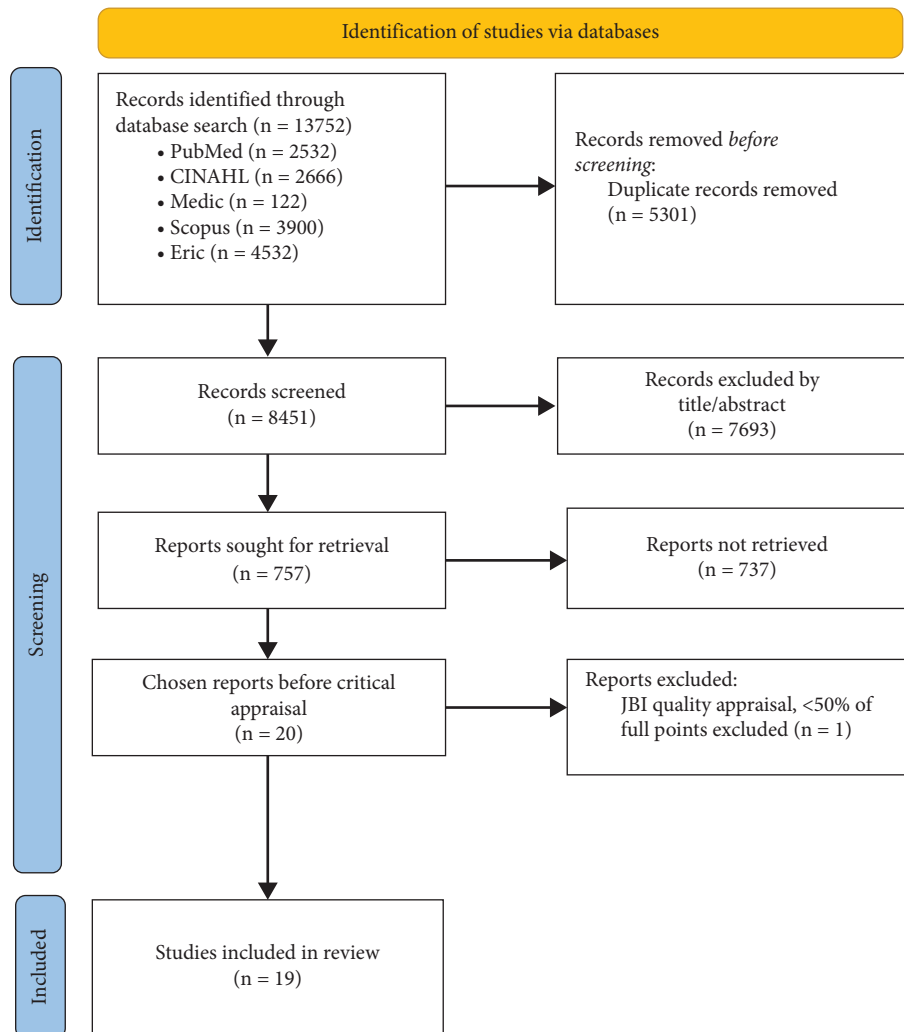


FIGURE 1: Prisma flow diagram [31].

educated nurses (IENs) include their birth year, gender, parenting responsibilities, visible minority status, and level of education. According to Primeau et al. [34]; in a study conducted on the career satisfaction of IENs in Canada, it was found that older and more experienced IENs tended to be more satisfied with their careers compared to their younger or less experienced counterparts ($p < 0.01$). In addition, women expressed higher levels of career satisfaction in the nursing field compared to men ($p < 0.05$). Furthermore, IENs with children under 16 were more satisfied ($p < 0.05$) with their careers than those without parental responsibilities. Men with children reported significantly higher satisfaction levels than women without children ($p < 0.05$). The study also revealed a distinction between visible minority groups ($p < 0.01$), with White and Asian individuals showing significantly higher levels of satisfaction ($p < 0.05$) compared to Black individuals, who tended to be the least satisfied. IENs with nonuniversity degrees before immigrating to Canada exhibited higher career satisfaction ($p < 0.01$) than those with undergraduate degrees, master's degrees, or PhDs. Similarly, the study indicated that higher levels of education attained before

immigrating were associated with lower levels of career satisfaction.

Significant differences were observed in education factors in the USA. There was a notable association between IENs and their enrolment in a degree programme after acquiring licensure ($p = 0.01$) as well as their pursuit of advanced academic degrees ($p = 0.02$) compared to nurses educated in the US (UENs). It was found that twice as many UENs ($n = 54$, 38%) obtained an additional degree following their licensure compared to IENs ($n = 10$, 19%). [35].

Primeau et al. [34] revealed that career characteristics substantially influence career and competence development. It was found that IENs who worked full time showed significantly higher satisfaction levels than those who worked part time or occasionally ($p < 0.01$). In addition, there were notable differences among nursing professions, with registered nurses and registered psychiatric nurses reporting significantly higher satisfaction levels than licensed practical nurses ($p < 0.01$). Furthermore, IENs differed significantly from their host nurses in terms of their practice roles ($p = 0.03$), predominantly working as staff nurses ($n = 52$, 98%) with fewer leadership responsibilities ($n = 1$, 2%).

TABLE 1: Data extraction.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Adeniran et al., 2013, USA	To determine differences between internationally educated nurses and nurses educated in the United States in their levels of mentoring functions, self-efficacy, and participation in professional development and career advancement	<p>A descriptive design, cross-sectional</p> <p>(1) Mentorship measure. (2) New General Self-Efficacy Scale. (3) Demographic questionnaire</p> <p>A web-based survey</p> <p>A power analysis, descriptive statistics, frequency and percentage estimates for categorical variables, mean, standard deviations, <i>t</i>-tests, Chi-square analyses</p>	<p><i>n</i> = 200 registered nurses (educated in the United States <i>n</i> = 145, internationally educated nurses <i>n</i> = 55), age 22–65 years, currently working in hospital settings for a minimum of 3 years within Philadelphia County</p>	<p>The level and quality of mentorship functions received by internationally educated nurses (IENs) were insufficient for them to advance to leadership positions as their counterparts' nurses educated in the United States (UEN).</p> <p>Significant disparities were noted in the role model function of mentoring (<i>p</i> = 0.02). Mentors for IENs were more ethnically diverse and less likely to hold leadership positions in their organisations. IENs (<i>n</i> = 10.18%) were half as likely to pursue another degree compared with UENs (<i>n</i> = 51.36%). UENs were significantly different from IENs in their practice role (<i>p</i> = 0.03). They reported receiving promotions significantly more frequently than IENs (<i>p</i> = 0.04). IENs worked predominantly as staff nurses (<i>n</i> = 52.98%), with a mere one IEN reporting working in the area of leadership (<i>n</i> = 1.2%). Practice roles among UENs were more diverse (<i>n</i> = 28.21%)</p>	8

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Alexis, 2014, UK	To determine internationally registered nurses' perception of discrimination, support, and their adjustment to a new environment in the National Health Service in England	<p>A descriptive design.</p> <p>(1) Discrimination. (2) Support. (3) Adjustment to a new environment</p> <p>A paper survey was constructed following the emergent themes from the qualitative data analysis</p> <p>Chi-square, Fisher exact, Kruskal–Wallis test</p>	<p>$n = 188$ internationally recruited registered nurses from 15 National Health Service Hospitals in England who be working for a minimum of 1 year, Black or of minority ethnic origin and had to be qualified as an international nurse</p>	<p>International registered nurses (IRNs) perceived that they were discriminated against in the workplace ($p < 0.00$) and patients and family members behaved difficultly and aggressively toward them ($p < 0.00$). IRNs perceived that White British nurses were aggressive towards them for a reason based on their racial features ($p < 0.01$). IRNs felt supported in their workplaces ($p < 0.01$). IRNs from Africa perceived discrimination as evident in the workplace; the support they received was limited, and their adjustment to a new environment was the weakest compared to the other IRNs</p>	4

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Alexis and Vydellingum, 2009, UK	To determine how overseas nurses perceive equal opportunities as well as the opportunities for skill development and training to be in the National Health Service in the United Kingdom	<p>A descriptive design, a questionnaire approach.</p> <p>(1) Biographical information for example grade. (2) Years of experience in their country of origin and the national health service. (3) Equal opportunity. (4) Discrimination. (5) Support mechanisms. (6) Adjustment to a new environment. (7) Skill development and training</p> <p>A survey approach was adopted to investigate the aims of the study</p> <p>A simple descriptive statistics, Chi-squared tests, Fisher's exact tests, Kruskal-Wallis tests, Mann-Whitney <i>U</i> tests, Spearman's tests</p>	<p><i>n</i> = 188 registered nurses and qualified as overseas nurses, black and minority ethnic origin, and be working in the National Health Service in the United Kingdom for a minimum of one year</p>	<p>Overseas nurses from African nurses perceived that were refused jobs based on their ethnic backgrounds whereas Filipino nurses were less likely to perceive this. Nurses from India and Pakistan were more likely to be promoted than any other group of international nurses. African nurses were more likely to perceive that they had been refused promotion based on their ethnicity. Filipino nurses indicated that their skills were more likely to be used than those of their African counterparts. In addition, the survey revealed that overseas nurses employed in NHS hospitals in London were more likely to be promoted and supported and less likely to have aggressive behaviour directed at them compared to those in NHS hospitals in non-London regions</p>	5
Almansour et al., 2020, Saudi Arabia	To investigate whether there is an association between nationality and nurse job satisfaction	<p>A cross-sectional design</p> <p>(1) McCloskey/Mueller Satisfaction Scale</p> <p>An online survey and a paper survey</p> <p>Preliminary analysis, a multiple linear regression analysis, a descriptive analysis</p>	<p><i>n</i> = 743 nurses from three major Government Hospitals in Saudi Arabia</p>	<p>Non-Saudi nurses had lower satisfaction rewards such as pay, holiday entitlement, and work/life balance. Compared with Saudi nurses, expatriate nurses had overall lower job satisfaction after controlling for other predictors. Expatriates were less satisfied than Saudi nurses with extrinsic rewards and family-work balance. However, Saudi nurses were less satisfied with their professional opportunities, praise and recognition, and coworker relationships</p>	8

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Bae, 2011, USA	To examine international nurses' perceptions of their organizational socialization and its association with intent to leave in both international and American nurses	<p>A descriptive design, secondary analysis of data from a hospital registered nurses survey</p> <p>(1) Organizational socialization (the quality of the orientation programme and support from supervisors and peers). (2) Nurses' intent to leave (within three years). (3) Nurses' country of origin</p> <p>A paper survey, an online survey</p> <p>Analysis of variance and Chi-square tests, a logistic regression model</p>	<p>$n = 752$ registered nurses ($n = 245$ international registered nurses, $n = 507$ American registered nurses) in the greater New York metropolitan area with less than five years of registered nurse experience in the USA</p>	<p>The orientation programme and support from peers and supervisors played an important role in the international nurse's organizational socialization process. Good supervisor and peer support were negatively associated with nurses' intent to leave (i.e., these nurses were less likely to leave within three years). The level of organizational socialization of foreign-educated RNs was higher than that of any other nurse groups, especially when looking at the item entitled "hospital provided adequate orientation" ($p < 0.01$). Lower proportions of the foreign-educated RNs (26%) and adult immigrant RNs (29.1%) reported that they had plans to leave within three years compared to American RNs (45.2%) and child immigrant RNs (39.3%)</p>	6
Butt et al., 2019, UK	To describe the employment outcomes of a refugee healthcare professional who participates in the Building Bridges Programme in the United Kingdom National Health Service	<p>A comparative design, statistical and contractual reporting</p> <p>(1) Employment outcomes. (2) (%) proportion of refugee healthcare professionals joining the Building Bridges Programme who settle in an associated healthcare profession position</p> <p>An electronic database</p> <p>Statistical and contractual reporting</p>	<p>$n = 83$ refugee nurses who participated in the Building Bridges Programme from October 2009 to March 2018 and sought employment in the UK National Health Service</p>	<p>The Building Bridges Programme provides 2/83 (2%) nurses settled into a registered National Health Service position appropriate to their (home country) professional qualifications. 34/83 (41%) nurses settled in associated healthcare profession positions</p>	4

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Cheng and Liou, 2010, Taiwan	To measure the predictability of cultural orientation on organisational commitment, perception of practice environment, and intention to leave amongst Asian nurses working in US hospitals	A cross-sectional design, postsurvey. (1) The Organisational Commitment Questionnaire. (2) Practice Environment Scale of the Nursing Work Index. (3) Anticipated Turnover Scale. (4) Collectivist Orientation Scale with satisfactory reliability A postal survey descriptive statistics, hierarchical regression, Pearson correlation, Mann-Whitney <i>U</i> -test, Sobel-test	<i>n</i> = 195 Asian nurses (44.1% Filipinos, 32.8% Chines) working at least six months in US hospitals	Organisational commitment is a key predictor of Asian nurses' intention to leave. Asian nurses who are more collectivist-oriented are more willing to accept the goals and values of the organisation, exert effort on behalf of the organisation, are more satisfied with their current practice environment and have less intention to leave their current job	5
Covell et al., 2018, Canada	To examine internationally educated nurses' perceptions of the extent to which participating in bridging programmes is beneficial for preparing to practise nursing in Canada	A cross-sectional design (1) Demographics. (2) Perceived benefits of bridging program participation (B ² P ⁻²)-scale descriptive statistics, linear multiple regression analysis	<i>n</i> = 360 internationally educated nurses who participated in bridging programmes, and live and work permanently as a nurse in Canada	Bridging programmes help internationally educated nurses address gaps in their cultural, practical, and theoretical knowledge. Source country and amount of professional experience influence the extent to which internationally educated nurses benefit from participating in bridging programmes in Canada. The regression model explained 11.5% of the variance in perceived benefits of bridging programme participation. Two predictors were statistically significant: source country and professional experience	8
Geun et al., 2018, Korea	To investigate factors affecting the turnover of Asian Foreign-educated nurses	A cross-sectional design (1) Supplement digital content 1 and 2. (2) Organizational Commitment Questionnaire. (3) McCain and Marklin Social Integration Scale. (4) Confidence and communication. (5) Job search self-rated health instrument: an online survey backward multivariable logistic regression	<i>n</i> = 201 Asian foreign-educated nurses in their 1 st year of employment in the United States	Perceived quality of orientation and affective commitment were the only significant predictors of turnover at the organizational level of Asian foreign-educated nurses. Perceived quality of orientation predicted organizational-level turnover and trended toward predicting unit-level turnover	6

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Goh and Lopez, 2015, Singapore	To examine the acculturation level of international nurses working in a multicultural society. The relationship between acculturation, working environment, and quality of life of international nurses was also explored	A cross-sectional, correlational study (1) World Health Organisation Quality of Life-BREF. (2) Practice Environment Scale of the Nursing Work Index-Revised A paper self-report questionnaire Descriptive statistic, histogram and QQ plot, mean score and deviation, a Pearson product-moment correlation coefficient	$n = 814$ international nurses working in Singapore	There were variations in the acculturation level among different nationality groups of international nurses. Acculturation levels were the lowest among mainland Chinese international nurses ($M = 27.47$, $SD 5.23$). A positive correlation was found between acculturation and quality of life whereas a lower perception of the work environment was associated with a lower acculturation level The presence of a supportive work environment is essential to retain migrant nurses. The results showed that migrant nurses were satisfied with their jobs, with job satisfaction negatively correlated with the work environment. Pre-existing groups of Chinese migrant nurses did not help newly arrived Chinese migrant nurses assimilate better. Predictors of migrant nurses' intentions to leave included having supportive nurse managers and a nursing practice environment Investment in promoting the well-being of recruited nurses, as illustrated by the significant planning effort and strategies employed by this organization, pays off in job satisfaction, and spills over into other areas of satisfaction and positive adaptation. Investing in promoting the well-being of recruits in both social and work contexts positively benefits job satisfaction and spills over into related areas of satisfaction and positive adaptation	6
Goh and Lopez, 2016, Singapore	To explore the job satisfaction level of migrant nurses working in a multicultural society and the relationship between their job satisfaction levels, work environment, their intentions to leave, and the predictors of their intentions to leave	A cross-sectional, correlation design using a stratified random sample (1) A demographic sheet. (2) The job satisfaction questionnaire (JSQ). (3) The practice environment scale-nursing work index-revised A survey A histogram prior, descriptive statistic, mean and standard deviations, a Pearson correlation coefficient analysis	$n = 495$ migrant nurses working in a tertiary public-funded hospital in Singapore for at least one year		5
Hayne et al., 2009, USA	To examine strategies to facilitate the cultural adaptation, job satisfaction, and perception of role and social support of a group of recruited Filipino nurses	A descriptive design (1) The nursing work index-revised edition. (2) Occupation stress inventory-revised edition A survey Normative statistic	$n = 15$ Philippine nurses who were recruited to the USA in 2003 and 2004		6

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Liou et al., 2013, Taiwan	To examine the relationship between acculturation, collectivist orientation, and organisational commitment among Asian nurses in US hospitals	A cross-sectional design using snowball sampling (1) The collectivist orientation scale. (2) Organisational commitment questionnaire. (3) Acculturation factors A paper survey A power analysis Pearson correlation, ANOVA, and regression	<i>n</i> = 195 east Asian nurses working in hospitals across the United States at least six months and performing direct patient care	To increase Asian nurses' commitment, administrators must understand their cultural values and provide them with a culturally competent and sensitive environment. Participants scored high on collectivism and commitment. Collectivism was significantly correlated with commitment but did not mediate acculturation factors and commitment	6
Liou and Grobe, 2008, Taiwan, Texas	To examine the relationship among collectivist orientation, perception of practice environment, organizational commitment, and intention to leave	A cross-sectional, correlational design snowball sampling (1) Collectivist Orientation Scale. (2) The Practice Environment Scale of the Nursing Work Index. (3) The Organizational Commitment Questionnaire. (4) Anticipated Turnover Scale Questionnaire Descriptive statistics, Pearson correlation and regression	<i>n</i> = 35 Asian nurses work in U.S. Hospitals	To prevent Asian nurses from leaving employment settings, increasing their organizational commitment appears to be indicated. Because perception of the practice environment is an antecedent of organizational commitment, providing a practice environment where nurses are satisfied is an alternative strategy to retain nurses. Organizational commitment mediates the perception of the practice environment and the intention to leave	5

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Ma et al., 2010, USA	To identify the demands of immigration among Chinese nurses who have immigrated to the USA. The relationship between the demands of immigration and length of stay in the USA was also investigated	A descriptive correlational study design (1) The demands of immigration scale. (2) Demographic questionnaire A self-administered survey frequency distributions, range, descriptive statistics	$n = 128$ Chinese nurses and immigrated to the USA	The immigration demands decreased as the length of stay in the USA increased. Still, the demands of immigration levels remained high for Chinese immigrant nurses compared to the Indian and Filipino nurses. Chinese immigrant nurses have high demands for immigration. There was a significant negative relationship between the demands of immigration and the length of stay in the USA. Immigration demands decreased as the length of stay increased but remained high even for those who had been in the USA for >5 years	5
Pittman et al., 2014, USA	To determine whether foreign educated nurses perceived they were treated equitably in the U.S. workplace during the last period of high international recruitment from 2003 to 2007	A descriptive design Four outcomes of interest. (1) Hourly wages. (2) Job satisfaction. (3) Adequacy of orientation. (4) Perceived discrimination An online survey Descriptive and regression analysis	$n = 629$ foreign-educated nurses in the USA	Foreign-educated nurses educated in low-income countries and those recruited by staffing agencies were significantly more likely than other foreign-educated nurses to report that they receive inequitable treatment compared with their U.S. counterparts. 40% of the foreign-educated nurses in this study perceived their wages, benefits, or shift or unit assignments to be lower than those of their American colleagues. Respondents from high-income countries were significantly less likely to perceive discrimination than respondents from low-income countries. 51% of respondents reported receiving insufficient orientation and 40% reported at least one discriminatory practice regarding wages, benefits, or shift or unit assignments	4

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Primeau et al., 2021, Canada	To identify the main correlates of internationally educated nurses' career satisfaction	<p>A cross-sectional analysis</p> <p>The instrument developed for the study includes four sections. (1) Eligibility (2) Integration. (3) Career advancement. (4) Demographics</p> <p>A survey electronically or on paper</p> <p>Kruskal–Wallis test, Spearman rank correlation test, and Mann–Whitney <i>U</i> test</p>	<p><i>n</i> = 1951 internationally educated nurses in Canada</p>	<p>Older and more experienced internationally educated nurses tended to be more satisfied with their careers than their younger or less experienced colleagues were. Males were inclined to be less satisfied than their female counterparts, and having children tended to make all three groups more satisfied. The higher level of education before immigrating the lower the career satisfaction. As for organizational characteristics, full-time nurses were more satisfied than those working part time or with occasional employment. Career satisfaction varied greatly depending on sociodemographic characteristics, organizational settings, and geographic location. Internationally educated nurses who identified as White or Asian had the highest level of career satisfaction, whereas those who identified as Black tended to be the least satisfied. Internationally educated nurses who thought they had achieved their career goals were more satisfied, while those who experienced discrimination were less satisfied with their careers</p>	5

TABLE 1: Continued.

Author(s), year of publication, country	Purpose	Methodology: study design, instruments, data collection, data analysis	Participants	Factors associated with integration	Quality assessment
Timilsina Bhandari and Xiao, 2014, Australia	To explore factors associated with the job satisfaction of overseas qualified nurses working in public hospitals in South Australia and to compare whether factors associated with job satisfaction of overseas nurses from English-speaking backgrounds differed from those from non-English-speaking backgrounds	A cross-sectional survey design (1) Job satisfaction of overseas-qualified nurses: index of work satisfaction, nursing work index-R, Mueller, and McCloskey satisfaction scale A survey Kolmogorov-Smirnov test, A Mann-Whitney U-test, Chi-square test, Spearman's correlation, content analysis	<i>n</i> = 151 overseas qualified nurses who work in five major public hospitals in South Australia	Four factors were found to influence job satisfaction: a supportive work environment, interpersonal relationships, communication in English, and salary and salary-related benefits. Communication in English was the predominant factor that was associated with job satisfaction in nurses from non-English-speaking backgrounds. This group of nurses also showed a negative correlation between length of stay in Australia and satisfaction with their work environment. Participants' responses to open-ended questions revealed issues relating to discrimination and racism Job satisfaction and feeling supported in the workplace are the most important factors influencing OQNs' successful adjustment into the Australian healthcare system. Three factors (job satisfaction, current work environment, and feeling at home in Australia) were found to be significant in measuring OQN's level of sociocultural adaptation. When the level of sociocultural adaptation was high, OQNs reported better general and psychological health	5
Zanjani et al., 2020, Australia	The primary aim was to examine factors associated with overseas qualified nurses' sociocultural adjustment to the Australian healthcare system. A secondary aim was to determine whether there was a correlation between overseas qualified nurses' sociocultural adjustment and their mental and physical health	A cross-sectional study (1) Sociocultural adaptation scale-revised. (2) The nurse international and transition questionnaire-2. (3) The perceived stress scale and general health questionnaire-12 A survey electronically Linear regression analysis, the Pearson correlation	<i>n</i> = 200 overseas qualified nurses working as registered nurses in the Australian healthcare system. Participants' English was not their first language and had completed the bridging courses offered in Australia before being granted nursing registration		6

TABLE 2: Factors associated with integrational strategies and models to support CALD nursing staff transition and adaptation to the professional workforce in healthcare settings.

Factors	Outcomes						
	Career and competence development	Workplace mentorship and preceptorship	Licensure and orientation to work	Collegial and peer support	Intra-organizational Workplace environment, diversity, and employee treatment	Organisation and management support and policies	Sociocultural learning and support
Participants (n)	n = 2339	n = 200	n = 393	n = 388	n = 2018	n = 1336	n = 200
Sociodemographic characteristic							
Individual characteristic							
Year born	p < 0.01						
Gender	p < 0.05						
Parenting	p < 0.05						
Visible minority	p < 0.01						
Education	p < 0.01						
Education							
Continued education credits/year	<i>p</i> = 0.08						
Received formal degree since last education	p = 0.01						
Currently pursuing an academic degree	p = 0.02						
Professional certification completed	<i>p</i> = 1.00						
Career characteristic							
Work status	p < 0.01						
Work hours/week	<i>p</i> < 0.50						
Hourly income	<i>p</i> < 0.30						
Annual income	<i>p</i> < 0.06						
Practice area	<i>p</i> < 0.60						
Practice role	p < 0.03						
Pay type	<i>p</i> < 0.28						
Nursing profession	p < 0.01						
First-year current employer	p < 0.01						
First-year current position	p < 0.01						
Achievement career goals	p < 0.01						
Integration process characteristic							
Year of migration	p < 0.01						
Year of the first job	p < 0.01						
Year of licence	p < 0.01						
Feeling at home							
Organisational characteristic							
Work setting	p < 0.05						
Region	p < 0.01						
Mentorship	p < 0.01						
Leadership	p < 0.01						
Promotion	p < 0.01						
							p = 0.01

p < 0.05

p = 0.01

TABLE 2: Continued.

Factors	Outcomes			
	Professional development	Licensure and orientation to work	Collegial and peer support	Sociocultural
Participants (n)	n = 2339	n = 393	n = 388	n = 200
				n = 1336
				n = 2018
Development				
Collectivist orientation	p < 0.01			p = 0.01
Organisational commitment				p < 0.001
Discrimination				
Experienced discrimination in the workplace	p < 0.01		p = 0.001	p = 0.001
Aggressive patients and their relatives				
Aggressive White British nurses				
Believe that refused jobs based on their ethnicity	p < 0.001		p < 0.001	p < 0.001
Average hourly wage				p < 0.05
Average job satisfaction score				NS
Adequacy of orientation				NS
Average count of perceived discriminatory practices				p < 0.05
Perceived at least on discriminatory practice				p < 0.01
Believed they did not receive pay comparable to U.S. peers				p < 0.01
Believed they did not receive the same benefits as U.S. peers				p < 0.01
Believed they received fewer desirable shifts or units than U.S. peers				NS
Believed that refused jobs based on their ethnicity				p < 0.001
The relationship between equal opportunity policies and ethnicity				p < 0.001
The relationship between equal opportunity and organisations				p < 0.001
The relationship between skills acquired from overseas and ethnicity				p < 0.001
Social support				
Social support		<i>p = 0.90</i>		
Feeling supported and ethnicity			p = 0.001	

TABLE 2: Continued.

Factors	Outcomes				
	Professional development	Licensure and orientation to work	Collegial and peer support	Intra-organizational	Sociocultural
Participants (<i>n</i>)	<i>n</i> = 2339	<i>n</i> = 393	<i>n</i> = 388	<i>n</i> = 2018	<i>n</i> = 200
Given sufficient time to become acquainted with the methods and procedures of their working environments					<i>p</i> = 0.12
Workplace environment					
Job satisfaction					
Current work environment					
Supportive work environment					
Interpersonal relationship					
Communication in English					
Salary and salary-related benefits					
Extrinsic rewards					
Scheduling					
Family/work balance					
Coworkers					
Interaction opportunity					
Professional opportunity					
Praise/recognition					
Control/responsibility					
Years of experience					
Length of stay					
Salary					
Education					
Nationality					
Filipino	<i>p</i> = 0.22				
Indian	<i>p</i> = 0.39				
Jordanian	<i>p</i> = 0.12				
South African	<i>p</i> < 0.05				
Malaysian	<i>p</i> = 0.81				
British	<i>p</i> = 0.05				
Other	<i>p</i> < 0.05				
Acculturation					
Perceived benefits of bridging program participation					
Source country: low income					<i>p</i> < 0.01
Language proficiency					<i>p</i> = 0.45

TABLE 2: Continued.

Factors	Outcomes						
	Career and competence development <i>n</i> = 2339	Professional development Workplace mentorship and preceptorship <i>n</i> = 200	Licensure and orientation to work to work <i>n</i> = 393	Collegial and peer support and peer support <i>n</i> = 388	Intra-organizational Workplace environment, diversity, and employee treatment <i>n</i> = 2018	Organisation and management support and policies and support <i>n</i> = 1336	Sociocultural Cultural training and support learning and support <i>n</i> = 200
Participants (<i>n</i>)							
Professional experience: years			<i>p</i> < 0.01				
Academic preparation: baccalaureate			<i>p</i> = 0.27				
Academic preparation: graduate			<i>p</i> = 0.52				
Settled into a registered NHS position appropriate to their home country			2%				
Settled in associated healthcare profession positions			41%				
Intention to leave							
Nurse's intent to leave within 3 years;							
Age							
Gender							<i>p</i> < 0.01
Citizenship							<i>p</i> < 0.01
Marital status							<i>p</i> = 0.23
Religion							<i>p</i> = 0.10
Nursing qualifications							<i>p</i> = 0.14
Work experience out of Singapore							<i>p</i> = 0.81
Years of experience							<i>p</i> = 0.85
Nursing practice environment							<i>p</i> = 0.13
Quality care							<i>p</i> = 0.40
Nurse manager ability							<i>p</i> = 0.49
Autonomy/professionalism							<i>p</i> = 0.01
Employment characteristics and demographics							<i>p</i> = 0.12
Treated as a colleague by peers							<i>p</i> = 0.03
Supported at work by supervisors							<i>p</i> = 0.06
The hospital provided adequate orientation							<i>p</i> < 0.01
Turn over organizational level							<i>p</i> < 0.01
Orientation evaluation							<i>p</i> = 0.09
Language fluency							<i>p</i> = 0.001
Affective organisational commitment							<i>p</i> = 0.64
Continuance organisational commitment							<i>p</i> = 0.34
Normative organisational commitment							<i>p</i> = 0.72
Social support							<i>p</i> = 0.15
Preparatory job search behaviour							

TABLE 2: Continued.

Factors	Outcomes			
	Career and competence development <i>n</i> = 2339	Professional development Workplace mentorship and preceptorship <i>n</i> = 200	Licensure and orientation to work to work <i>n</i> = 393	Collegial and peer support and peer support <i>n</i> = 388
		Workplace environment, diversity, and employee treatment <i>n</i> = 2018	Organisation and management support and policies <i>n</i> = 1336	Sociocultural Cultural training, learning and support <i>n</i> = 200
Active job search behaviour			<i>p</i> = 0.127	
Self-rated health-poor			<i>p</i> = 0.13	
Turn over unit level			<i>p</i> = 0.04	
Orientation evaluation			<i>p</i> = 0.19	
Language fluency			<i>p</i> = 0.01	
Affective organisational commitment			<i>p</i> = 0.82	
Continuance organisational commitment			<i>p</i> = 0.82	
Normative organisational commitment			<i>p</i> = 0.11	
Social support			<i>p</i> = 0.04	
Preparatory job search behaviour			<i>p</i> = 0.05	
Active job search behaviour			<i>p</i> = 0.23	
Self-rated health: poor				

Statistical significance has been marked in bold, *p* values <0.05.

Moreover, IENs who believed they had achieved their career goals experienced higher satisfaction levels ($p < 0.01$), while those who faced discrimination expressed lower satisfaction with their careers. The study also highlighted that the first year at the current employer and position had a negative association with career satisfaction. At the same time, there was a moderate and positive association with achieving career goals, all at a significant level of $p < 0.001$. Furthermore, the findings revealed a significant difference in promotions, with UENs reporting a significantly higher frequency of promotions than IENs ($p = 0.04$). In comparison to UENs ($n = 38, 28\%$), a higher proportion of IENs ($n = 20, 41\%$) indicated that they had never received a promotion [35].

Alexis et al. [36] investigated how overseas nurses perceive equal opportunity in the UK. Their study found that African nurses ($p < 0.001$) were more likely to perceive discrimination regarding job refusals based on their ethnic backgrounds. In contrast, Filipino nurses were less likely to have such perceptions. On the other hand, nurses from India and Pakistan had a higher likelihood of being promoted than other groups ($p < 0.001$). In contrast, African nurses were likelier to perceive that they were denied promotions due to ethnicity ($p < 0.001$). Also, geographical location plays a significant role in the perception of ethnic-based denial of promotions ($p < 0.008$).

Primeau et al. [34] found that integration process characteristic factors—a year of immigration ($p < 0.01$), year of the first job ($p < 0.01$), and year of licensure ($p < 0.01$)—were negatively correlated with the job satisfaction of IENs. These results highlight the importance of acculturation and workplace integration with higher levels of job satisfaction among highly qualified immigrants.

When examining organisational characteristics, it becomes evident that IENs working in hospitals experience higher satisfaction levels than those working in long-term care facilities ($p < 0.05$). IENs who perceive themselves as being given fewer opportunities than host nurses or encountering discrimination report significantly lower satisfaction levels ($p < 0.01$). In addition, geographical location plays a role in career satisfaction, with significant variations observed ($p < 0.01$). Furthermore, factors such as mentorship ($p < 0.01$), leadership ($p < 0.01$), promotion ($p < 0.01$), and development ($p < 0.01$) have been identified as significantly correlated with the career satisfaction of IENs [34].

4.1.2. Workplace Mentorship and Preceptorship. The study conducted by Adeniran et al. [35] revealed that the level and quality of mentoring received by IENs were deemed insufficient for their advancement to leadership positions compared to that of their counterparts, UENs. Notably, mentors for IENs were found to be more ethnically diverse ($p < 0.001$) and less likely to hold leadership positions within their organisations ($p = 0.01$) compared to UEN mentors. In addition, IENs were less inclined to view their mentors as role models ($p = 0.02$).

4.1.3. Licensure and Orientation to Work. When examining training factors, Butt et al. [37] investigated the perceived benefits of participation in the Building Bridges Programme

among refugee healthcare workers. The Building Bridges Programme is designed to help refugee healthcare workers fill gaps in their cultural, practical, and theoretical knowledge to support them in finding employment. The study findings indicate that among the program participants, 2% could secure registered positions that matched their professional qualifications from their home country, while 41% obtained positions in related healthcare fields. Furthermore, a related study by Covell et al. [38] discovered that specific factors influenced the perceived benefits of participating in a comparable bridging programme. Notably, the classification of the source country as low income ($p < 0.01$) and the IENs having fewer years of professional experience ($p < 0.01$) were associated with a higher perception of benefits from the Bridging Programme. The regression model employed in the study accounted for 11.5% of the variance in the perceived benefits of participating in the Bridging Programme.

The study conducted by Alexis et al. [36] found significant statistical differences in the level of dissatisfaction concerning the number of attended training courses and grades among overseas nurses compared to their white host country counterparts ($p < 0.001$). The research also found disparities in the availability of training course opportunities based on ethnicity and grades ($p < 0.002$).

4.2. Factors Associated with Intraorganisational Strategies

4.2.1. Collegial and Peer Support. Alexis's [12] study aimed to investigate the perception of perceived discrimination and ethnicity among international registered nurses (IRNs) in the UK. The findings of the study revealed that IRNs perceived instances of discrimination within the workplace ($p < 0.001$). Specifically, African nurses were more likely to perceive discrimination than nurses from India and Pakistan. In addition, the study highlighted that White British nurses were perceived as exhibiting difficult, aggressive, or hostile behaviour towards IRNs based on their ethnicity ($p < 0.001$).

Furthermore, the study also investigated the perception of social support among IRNs in the UK. It was found that IRNs generally felt supported in their workplace ($p < 0.001$), with both Indian and Pakistani nurses perceiving higher support levels than their international counterparts. On the other hand, African nurses reported receiving the least amount of support in the working environment. Notably, IRNs acknowledged receiving assistance from their White British colleagues, which was statistically significant ($p < 0.01$). Similarly, Alexis et al.'s [36] study supported the findings that experiences of discrimination in the UK varied based on race and ethnicity. Specifically, Black minority IENs were more likely to experience discrimination than Asian-Pacific and Caucasian IENs [12].

4.2.2. Workplace Environment, Diversity, and Employee Treatment. A healthy work environment was found to positively impact the career development of IENs, while poor work environments act as barriers to their career

advancement [34, 35]. The research conducted by Goh and Lopez [39] demonstrated that job satisfaction among migrant nurses in Singapore was negatively correlated with the work environment. The study further indicated that international nurses with lower reported acculturation levels also reported lower perceptions of their work environment. Predictors of IENs' intentions to leave their current positions included having supportive nurse managers ($p = 0.03$) and a favourable nursing practice environment ($p = 0.01$). Also, the study found ethnic differences and Indian nurses reported the highest level of job satisfaction, followed by Malaysian, Filipino, Myanmar, and Chinese nurses. Almansour et al. [40] aimed to investigate the link between nationality and nurse job satisfaction in Saudi Arabia. The study findings indicated that Saudi nurses reported higher levels of satisfaction compared to non-Saudi nurses (IENs) regarding extrinsic rewards ($p < 0.005$) and achieving a work-life balance ($p < 0.005$). Conversely, IENs expressed greater satisfaction than Saudi nurses in areas such as co-worker relationships ($p < 0.005$), professional opportunities ($p < 0.005$), and receiving praise and recognition ($p < 0.005$).

The study conducted by Timilsina Bhandari et al. [41] demonstrated that communication in English ($p = 0.001$) emerged as the predominant factor associated with job satisfaction among nurses from non-English-speaking backgrounds. In addition, overseas nurses exhibited a negative correlation between the duration of their stay ($p < 0.05$) in Australia and their satisfaction with the work environment. Interestingly, the longer overseas-qualified nurses remained employed in Australia, the less satisfied they became.

Organisational socialisation demonstrated a significant negative correlation with the intention of IRNs to leave within three years ($p < 0.01$). This indicates that IRNs who reported higher levels of organisational socialisation were less likely to leave their current positions within three years. Specifically, two aspects of organisational socialisation—that is, being treated as a colleague by peers ($p < 0.05$) and receiving support from supervisors ($p < 0.01$)—were found to be negatively associated with nurses' intention to leave. Notably, the level of organisational socialisation among IRNs was higher compared to those among other nurse groups, particularly in terms of the item assessing whether the hospital provided adequate orientation ($p < 0.01$) [42].

Geun et al. [43] examined the factors influencing the turnover of Asian foreign-educated nurses in the USA. The findings revealed that perceived quality of orientation ($p < 0.001$) and affective commitment ($p < 0.001$) were significant predictors of turnover at the organisational level. Specifically, the perceived quality of orientation predicted turnover at the organisational level and revealed a trend in predicting turnover at the unit level ($p = 0.01$). Additionally, preparatory job search behaviours ($p = 0.04$) and active job search behaviours ($p = 0.05$) were associated with unit-level turnover.

Alexis [12] study revealed that IENs *perceived discrimination* in the workplace, specifically from patients and their family members ($p < 0.01$). The data further indicated that African nurses were more inclined to perceive such

discrimination than the other three groups of IENs. Further, Pittman et al. [44] discovered that IENs experienced discrimination and expressed concerns regarding the disparity in pay ($p < 0.01$) and benefits ($p < 0.01$) compared to their US counterparts. The study revealed that 51% of the IENs reported insufficient orientation, while 40% reported facing at least one discriminatory practice ($p < 0.01$) related to wages, benefits, or shifts/assignments. Compared to other IENs, IENs educated in low-income countries and those recruited through staffing agencies were more likely to report receiving unfair treatment than their US counterparts ($p < 0.05$). In addition, IENs recruited through staffing agencies reported significantly lower wages than self-employed IENs ($p < 0.05$), and the wages were found to be approximately 14% higher for IENs educated in high-income countries compared to those educated in low-income countries.

Liou et al. [45] conducted a study investigating the relationship between acculturation, *collectivist orientation*, and organisational commitment among Asian nurses in hospitals in the US. The findings revealed a significant correlation between collectivism orientation and organisational commitment ($p = 0.001$). Participants born in Asian countries other than the Philippines demonstrated lower levels of organisational commitment. In addition, in a study by Cheng and Liou [46], it was discovered that organisational commitment ($p < 0.001$) serves as a significant predictor of the intention of Asian nurses to leave their positions in US hospitals. Moreover, Asian nurses with a stronger collectivist orientation are more willing to embrace the organisation's goals and values, experience higher satisfaction with their current work environment, and display a reduced intention to leave their current job.

The research conducted by Ma et al. [47] demonstrated that Chinese immigrant nurses had a high demand for immigration. It was observed that there was a significant negative relationship ($p = 0.01$) between the demands of immigration and the duration of stay in the US. As the duration of stay increased, the demands of immigration decreased, but even among those who had been in the US for over five years, the demands remained relatively high.

4.2.3. Organisational and Management Support and Policies.

The study conducted by Alexis et al. [36] found that African IENs, in particular, were unaware of their employers having an equal opportunity policy ($p < 0.001$). In addition, IENs working in London hospitals perceived equal opportunity policies as more effective than nurses in non-London hospitals ($p < 0.001$). Moreover, Filipino nurses expressed a higher likelihood of their skills being utilised than their African counterparts ($p < 0.002$).

4.3. Factors Associated with Sociocultural Integration.

In a study conducted by Zanjani et al. [48], job satisfaction and integration process characteristic factors were identified as influencing the sociocultural adjustment of IENs to the Australian healthcare system; job satisfaction ($p < 0.01$), current work environment ($p = 0.02$), and a sense of feeling

at home ($p = 0.01$). When IENs achieved a high level of sociocultural adaptation, they reported better overall health and physical well-being. The study also highlights the primary motivations that drove IENs to relocate to Australia. The dominant pull factors were creating a better life for their families (68.5%), improving their financial situation (56.5%), and perceiving political stability (49%) in their new country. Conversely, the main push factors that influenced their decision to leave their home countries were low pay (71.5%) and a lack of opportunities for further nursing education (68%).

According to the findings of Goh and Lopez's [49] study, mainland Chinese IENs working in Singapore exhibited the lowest levels of acculturation. The study also revealed a positive correlation ($p < 0.01$) between acculturation and quality of life, thereby indicating that higher levels of acculturation were associated with a better perception of one's overall well-being. Conversely, a lower perception of the work environment was linked to lower levels of acculturation. In a study by Hayne et al. [50], the researchers examined strategies to help Filipino nurses adapt to cultural aspects after being recruited in the US. The findings indicate that investing in promoting the well-being of recruits in social and work contexts positively impacts job satisfaction and extends to other areas of satisfaction and positive adaptation.

5. Discussion

This systematic review identified multiple factors associated with the successful integration of CALD nurses, thereby highlighting their impact on integration strategies and models. These factors were classified into the following six categories: sociodemographic characteristics, discrimination, social support, organisational support, workplace environment, and acculturation.

Numerous factors influence job satisfaction and can vary in cultural contexts and value systems. Low job satisfaction among CALD nurses significantly contributes to high turnover rates, eventually impacting the quality and safety of patient care [51]; [52, 53]. The findings of this review indicate that a range of factors can influence job satisfaction among CALD nurses. The work environment plays a vital role in the job satisfaction and career development of CALD nurses. Factors such as having supportive colleagues, supervisors, and mentors, receiving equal treatment as employees, having access to adequate resources and educational opportunities, and being part of a positive team culture significantly contribute to the overall job satisfaction of CALD nurses. Thus, the findings of this study demonstrate that individual characteristics (age, gender, parenting responsibilities, ethnicity, and education) with factors related to career development, organisational characteristics, and the integration process collectively influence job satisfaction among CALD nurses.

In addition, the findings indicated variations in job satisfaction among different racial and ethnic groups, with Black minority nurses demonstrating lower levels of job satisfaction than their White counterparts. Creating

a supportive and inclusive work environment that respects and recognises their characteristics can further enhance the job satisfaction of CALD nurses [51]. When nurses feel valued, respected, and supported in their work environment, they are more likely to experience higher levels of job satisfaction [54, 55].

The findings of this study confirm those of previous research that noted that discrimination against CALD nurses exists in healthcare organisations [11, 56], and minority nurses are at higher risk of discrimination than native or majority nurses [56]. In this study, it was found that CALD nurses may experience differential treatment compared to their colleagues, which includes fewer opportunities for professional development, lower pay and benefits, limited choice in shifts, inadequate access to education, limited chances for promotion and leadership roles, insufficient quality of mentoring, and challenges in maintaining work-life balance. In addition, there was evidence that CALD nurses feel mistreated at work by their fellow nurses, patients, and their families. The experiences of discrimination varied depending on race and ethnicity; those in the Black minority were more likely to experience discrimination and lack of support compared to other CALD nurses and were less unaware of their employers have an equal opportunity policy. Moreover, CALD nurses who were educated in low-income countries or were recruited through staffing agencies were more likely to report experiencing unequal treatment compared to their counterparts—for example, wages were found to be approximately 14% higher for CALD nurses educated in high-income countries compared to those educated in low-income countries.

Furthermore, certain healthcare workplaces and individuals may lack cultural competence, which refers to understanding and effectively working with people from diverse cultural backgrounds [57]. Without this understanding, discrimination and biases can arise, impacting CALD nurses' experiences in the workplace [58–60]. Moreover, inadequate policies, lack of diversity and inclusion initiatives, and biases in recruitment and promotion processes may perpetuate discriminatory practices [60].

A CALD nurse's linguistic competence can challenge their integration into the working environment [61]. This study reveals that communication in English emerged as a predominant factor associated with job satisfaction among nurses from non-English speaking backgrounds. Bridging programmes and language support initiatives are designed to assist CALD nurses in adapting their education and skills to meet the requirements of the new healthcare system. These programs provide language training, cultural orientation, and additional education or training to enhance their competence and enable a smooth transition into the new healthcare environment [62].

Acculturation involves learning and adopting the values, behaviours, and traditions of another group or society, it is the process by which a cultured individual adopts some customs and cultural norms of another culture. This process can happen on a group or individual personal level, for instance, when an individual moves to a new country and adopts the customs of their new cultural context [63]. To

enhance the commitment of Asian nurses, it is crucial to understand their cultural values and create a culturally competent and sensitive environment. In the context of Asian cultures, which often have collectivist values, individuals prioritise the needs and goals of the group over individual interests. This orientation can significantly influence the level of organisational commitment among Asian nurses [45, 64, 65]. The findings of this study reveal that Asian nurses with a stronger collectivist orientation demonstrate more significant organisational commitment and job satisfaction. For example, nurses born in China demonstrated a lower level of organisational commitment and acculturation. They expressed a greater desire to immigrate to other countries to practice healthcare. Organisations that employ a significant number of Asian nurses with a collectivist orientation can influence this cultural value by fostering an environment that supports teamwork, collaboration, and a sense of belonging.

Finally, the findings revealed that the factors that influence the sociocultural adjustment of CALD nurses include job satisfaction, the current work environment, and a sense of belonging in the host country. The successful adaptation to the sociocultural aspects of a new country is a crucial component of the migrant experience, thereby impacting mental health and overall psychological well-being in their professional roles [66].

5.1. Limitations and Strengths. The PRISMA 2020 checklist was completed and implemented during this systematic review process [31]. One of the limitations of this study concerns publication bias, as it only included published, peer-reviewed articles in English or Finnish, and the search did not include a search for grey literature. In addition, this review was conducted following the JBI guidelines for evidence synthesis, explicitly focusing on systematic reviews to ensure transparency in reporting the review process and findings. In addition, the JBI critical appraisal tool for analytical cross-sectional studies was utilised to assess the methodological quality of the included studies.

The synthesis of statistics in this review posed a significant challenge due to the heterogeneity observed in outcomes across the included studies. Variations in study designs, populations, interventions, and outcomes can impede the pooling of data or the formulation of definitive conclusions.

The adopted methodological choice of a systematic review may have introduced limitations due to the nonconsideration of diverse knowledge, such as policy papers that may have proved valuable to our findings [67]. However, we find that a systematic review was well suited due to the opportunity this research method offers as a systematic, unbiased approach towards providing existing research findings that may inform practice, policy, and future research [68]. Furthermore, systematic reviews are used to build an evidence base that confirms or refutes current practice [28]. In the case of this review, established evidence relating to factors associated with CALD nurse organisational integration may be used to confirm or refute current organisational integration practices.

6. Conclusion

The factors associated with integrational strategies and models developed to support the transition and adaptation of CALD nurses to the professional workforce in healthcare include sociodemographic characteristics, discrimination, social support, organisational support, workplace environment, and acculturation. The study highlights the significance of job satisfaction among CALD nurses, emphasising its impact on turnover rates and, consequently, patient care quality and safety. Factors influencing job satisfaction include supportive work environments, equal treatment, access to resources and education, and positive team culture. Furthermore, the review underscores disparities in job satisfaction among different racial and ethnic groups, with Black minority nurses often experiencing lower levels of job satisfaction. It stresses the importance of creating inclusive workplaces to enhance the job satisfaction of CALD nurses. The study also addresses discrimination against CALD nurses within healthcare organisations, noting challenges such as limited professional development opportunities, unequal pay, and mistreatment by colleagues, patients, and families. In addition, it discusses the role of cultural competence in CALD nurse integration, highlighting the importance of communication skills, language support initiatives, and understanding cultural values, particularly among Asian nurses with collectivist orientations. Finally, the review emphasises the impact of sociocultural adjustment on CALD nurses' professional roles and overall psychological well-being, stressing the importance of support mechanisms for successful adaptation.

Overall, this systematic review provides comprehensive insights into the challenges and facilitators of integrating CALD nurses into healthcare systems, offering valuable implications for policy and practice in fostering inclusive and supportive work environments. This research is valuable for identifying specific integration needs and adapting support strategies accordingly. Based on the study's outcomes, we recommend policymakers, nurse employers, and nurse leaders implement targeted interventions, engage CALD nurses in ongoing professional development, and provide language support services to improve the supportive environment. Comprehensive cultural competency training for all healthcare staff, including managers, enhances cultural competence in healthcare work environments, improving the ability to work with nurses from diverse cultural backgrounds effectively. Establishing clear guidelines to address discrimination and bias creates a supportive environment where CALD nurses feel valued and respected, facilitating their adaptation and integration into the healthcare organisation. In future research, there is a need to address the worsening global nursing shortage, which is driving a rise in international nurse migration to developed countries. Ensuring fair treatment and ethical integration is crucial for CALD nurse work satisfaction and organisational success. There is a need to involve patients through research and understand their experiences with CALD nurses, which may help better patient-CALD nurse relations and may result in positive care outcomes. With emerging technology-

enhanced healthcare as a solution for nurse human resource shortages, patients uncomfortable with international nurses may choose technology as a substitute. This raises the question of whether developed countries' healthcare institutions will invest in international nurse integration due to cost concerns. We, however, note that nurse migration is on the rise due to current and future nursing workforce shortages, and research on organisational integration of CALD nurses shows that better outcomes could be achieved if organisations were to invest and structure integration strategies within the formal structure of a healthcare organisation.

7. Relevance to Clinical Practice

Our results point out factors that associate integrational strategies and models to support the transition and adaptation of CALD nurses to the professional workforce in healthcare settings. Ensuring the integration of CALD nurses into clinical practice benefits encompass enhancing of diversity and cultural competence of the healthcare team and enabling knowledge and skills exchange with nurses who have a global health perspective prevalent in their home countries. Cultural diversity enhances patient-centered care by making patients feel more comfortable and respected when coming from diverse backgrounds themselves. Eventually, CALD nurses' integration can address workforce shortage and competence exchange among the countries. This study has a significant implication on nursing management since previous research on CALD nurse organisational integration has established that nurse leaders and managers are integral in supporting the entire workforce through equity and equality towards bettering CALD nurse integration. The findings have established factors associated with CALD nurse organisational integration; these findings impact nursing workforce practices and how a healthcare organisation may invest in developing structural strategies and models that support CALD nurse integration the best.

Data Availability

All data generated during this study are included within the article.

Additional Points

What Does This Paper Contribute to the Wider global Community? (i) Effective integration allows culturally and linguistically diverse nurses to maximise their career potential as professional nurses in their host countries. Therefore, any strategies and models developed and implemented must adopt a multidimensional approach, considering factors associated with integrating culturally and linguistically diverse nurses. (ii) A safe and supportive work environment plays a vital role in the job satisfaction and career development of culturally and linguistically diverse nurses. (iii) Black minority nurses demonstrate lower levels of job satisfaction than their White counterparts, emphasising the need to build an inclusive work environment with zero avoidance to discrimination.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Supplementary Materials

Supplementary File 1: search strategy used in the electronic databases. Supplementary File 2: assessment of methodological quality of the included studies using JBI critical appraisals. (*Supplementary Materials*)

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Research Article

Factors Contributing to Nurses' Intention to Leave the Profession: A Qualitative Study in Catalonia, Spain, following the Latest Waves of COVID-19

Carolina E. Watson ¹, Maria Dolores Bernabeu-Tamayo ¹, David Giménez-Díez ¹,
Manuel Lillo-Crespo ^{2,3} and Juan M. Leyva-Moral ¹

¹Autonomous University of Barcelona, GRIVIS Research Group, Nursing Department, Faculty of Medicine, Av. Can Domènech s/n, Bellaterra 08193, Spain

²HLA Vistahermosa Hospital, Alicante, Spain

³Nursing Department, University of Alicante, Alicante, Spain

Correspondence should be addressed to David Giménez-Díez; david.gimenez@uab.cat

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Introduction. The COVID-19 pandemic has had a significant impact on healthcare professionals globally, with nurses facing diverse challenges at the forefront. Despite their resilience, nurses are experiencing emotional burdens, which have contributed to a growing intention to abandon the profession. Understanding these factors is crucial for addressing the global nursing shortage. **Methods.** A qualitative descriptive approach was utilized for this study. Nurses who were actively working during the last waves of the pandemic in Catalonia, Spain, were intentionally recruited through social media and personal contacts, and data were collected through online semistructured interviews until data saturation was reached. Data were analyzed using Braun and Clarke's thematic analysis method. **Results.** Fourteen nurses, with an average of 22.8 years of work experience, were interviewed. Thematic analysis revealed three main themes: (1) the impact of COVID-19 on health, (2) factors influencing the decision to stay, and (3) recommendations to improve crisis management. **Conclusion.** Nurses faced significant emotional impacts but demonstrated dedication and resilience. Their decision to persevere was influenced by factors such as responsibility, guilt, and economic stability. Urgent measures are necessary to provide tailored mental health support and recognize emotional challenges in crisis preparedness.

1. Introduction

The COVID-19 pandemic generated an unprecedented global health crisis, affecting millions of individuals worldwide, including healthcare professionals. At the forefront of this unexpected battle, nurses assumed a challenging role by caring not only for those impacted by COVID-19 but also playing an important part in preventing infection. In addition, nurses took on more responsibilities and learned new techniques and skills related to the novel situation at the start of the outbreak, including providing psychological support facing isolation, remote patient monitoring, PCR tests, among

others. Despite the negative effects that nurses may have faced in terms of health and job satisfaction, they bravely dealt with the health-related challenges accompanying the pandemic, especially in the areas of mental health, isolation, and physical sequelae [1, 2]. Consequently, such ongoing struggle led to emotional and psychological burdens as well as fatigue, which impacted nurses' professional and personal well-being. This may be the reason for the continuing rise in their intention to abandon the profession, which subsequently contributes to the global nursing shortage and healthcare organizations' endeavor to provide professional, high-quality, and safe care [2].

There is considerable interest in the impact of COVID-19 on the emotional and mental well-being of healthcare providers, particularly in the initial year and early waves of the pandemic. These professionals were exposed to high levels of stress, anxiety, and physical and emotional exhaustion due to the uncertain situation they found themselves in [3]. In this context, early evidence suggests that a substantial number of healthcare workers experienced mood and sleep disturbances during the initial stages of the COVID-19 outbreak [4].

Moral distress, compassion fatigue, burnout, and post-traumatic stress disorder (PTSD) have been used to describe emotional states that lead many health professionals, including nurses, to consider abandoning the profession [5]. However, it is important to note that nurses who experience unresolved stress are more susceptible to burnout [6], which highlights the interconnectedness of these emotional challenges. Moreover, nurses working on the front lines have reported experiencing fear, anxiety, stress, social isolation, depressive symptoms, uncertainty, and frustration [7], underscoring the severity and complexity of the emotional toll faced by healthcare professionals. In line with the scientific literature, these experiences impact psychological well-being and can significantly affect job satisfaction, potentially influencing one's intention to abandon the profession [8, 9].

Burnout leads to poor job satisfaction and a higher likelihood of turnover [10]. Even prior to the COVID-19 pandemic, factors such as psychological stress, job burnout, and dissatisfaction were already related to a higher turnover intention [11]. A healthy work environment has positive effects on nurses, and nursing care is positively linked with patient outcomes [12]. This context may explain why nurses' well-being and turnover intention became serious concerns for healthcare managers and decision-makers regarding the workplace due to the additional stress experienced during the COVID-19 pandemic [8].

In some cases, during the early stages of the pandemic, nurses directly caring for COVID-19 patients, especially those who felt poorly prepared and overwhelmed, exhibited a high intention to leave their job [13]. This phenomenon of turnover intention has been explored in the literature. For instance, Yu et al. [9] suggest that during the early stages of the pandemic, the intention to leave among nurses was notably lower compared to the data provided by mass media reports, suggesting a discrepancy in perceptions. On the other hand, Raso et al. [14] indicated that 11% of a sample of over 5,000 nurses expressed an intent to leave their positions, while 20% remained undecided. However, when considering leaving the profession or being undecided about their future career path, both percentages were lower at 2% and 8%, respectively. Further insight into this phenomenon is provided by Nashwan et al. [15]; whose study conducted in Qatar during the initial waves of COVID-19 compares turnover intentions before and during the pandemic, revealing significantly higher turnover intentions during the pandemic period compared to before COVID-19.

This evidence underscores the complexity of nurses' intentions to leave their positions during the pandemic and

emphasizes the importance of understanding the contextual factors that influence turnover intentions. Much of the existing literature—including studies published in 2023—relies on data collected between 2020 and 2021. It is noteworthy that during that period, the cumulative stress and professional fatigue associated with COVID-19 were still in their early stages. Consequently, these numbers may fluctuate due to prolonged exposure to the situation. The impact of the prolonged duration of the pandemic and the experiences accumulated over subsequent waves of COVID-19 in 2022 have not been as comprehensively explored in the literature to date. Hence, there is a lack of qualitative studies that specifically address this phenomenon, which are needed to deepen our understanding of healthcare professionals' experiences.

Widespread shortages of nurses on a global scale pre-dating the pandemic [12, 16], exacerbated by the emergence of COVID-19 [17], underscore the critical need to delve into the reality experienced during the later stages of the pandemic. It is crucial to delve deeper into the underlying motivations and circumstances that have contributed to the alarmingly high rates of nurses expressing an intention to abandon their nursing practice. In this investigation, we aim to study the impact of COVID-19 on motivation and emotional well-being of Spanish nurses, specifically within the context of the sixth and seventh waves of COVID-19 (Oct 2021 to Feb 2022 and May/June 2022 to Aug 2022). Identifying the underlying factors that may influence nurses to consider abandoning the profession is essential, as understanding what drives nurses' intentions to leave has significant implications for the ability of health systems to cope with future health crises. Our findings may be helpful for healthcare managers, policymakers, researchers, and educators to gain a comprehensive view of this phenomenon; the results can also be utilized to design and implement strategies to help nurses cope with stress, to motivate them, to improve their well-being, and to retain them within healthcare organizations.

2. Methods

2.1. Design. We used a descriptive qualitative method to explore nurses' perspectives on their lived experiences, focusing on their intention to leave the profession alongside the factors and motivation influencing nurses' decisions to continue working as nurses despite this initial intention. Within this framework, we delve into the motivations of nurses who express the intention to leave the field, regardless of whether they have actually left or ultimately decided to stay, in order to provide a comprehensive understanding of the "intention to leave" phenomenon. This approach aims to provide clear descriptions of personal experiences and perspectives without unnecessary complexity or ambiguity [18].

2.2. Participants. Participants were selected through purposive sampling [19], guided by a decision-making framework aimed at achieving representativeness and diversity in terms of work experience, gender, age, and geographic

location, while ensuring sample diversity among those who met the inclusion criteria. The study's inclusion criteria were to be a registered nurse who (1) had worked in the region of Catalonia, Spain, during the approximate periods of the sixth and seventh waves of the COVID-19 pandemic in this region and (2) had intention to leave the profession. This method aimed to capture a range of perspectives and experiences to enrich the analysis and interpretation. Information about the study was distributed using social media and personal contacts. Once participants contacted the principal investigator, the full details of the study were provided, and all possible doubts were dispelled in order to obtain their informed consent. Prior to each interview, participants were provided with a detailed explanation of the study and its importance, aiming to establish trust and rapport. All doubts and concerns were addressed to ensure participants felt comfortable and willing to share their experiences openly. Pseudonyms were used to ensure anonymity. The research team assured the participants that their information would be kept confidential. This was expressed openly in the informed consent form. The participants did not receive any financial incentive for their involvement. Finally, 14 nurses agreed voluntarily to participate and gave written consent to be interviewed. Even though they were informed about their freedom to withdraw from the study whenever they needed or wished to, none of them did.

3. Data Collection

We gathered data through semistructured interviews between January and March of 2023. Each interview was conducted within a 30–45 minute framework, and participants were given the flexibility to choose their preferred meeting format, with all opting for online convening. The interviews were carried out using Teams® by a researcher with broad experience conducting these types of interviews who did not have any direct relationship with the healthcare organizations where the nurses worked. A script was developed based on prior knowledge and research concerns, and the final version was created after several team meetings (see Table 1). The study's objectives guided the design of the questions, which focused on the emotional impact of subsequent waves of the pandemic, the nurses' experiences, and their reasons for intending to leave the profession, as well as the factors that influence their intention and decision.

The study participants were encouraged to share their experiences during the pandemic, including their feelings, thoughts, and personal reflections. Qualitative, descriptive studies normally use small samples [20]; however, the final sample size was determined through data saturation [21]. Data saturation is achieved when enough information has been obtained to replicate the study and when the ability to obtain additional information has been accomplished and further coding is no longer feasible [22].

3.1. Data Analysis. We performed thematic analysis following the method developed by Braun and Clarke [23] with assistance from the Atlas.tiV8 software. This analytical

approach is employed in qualitative research to address general research inquiries. The outcome of thematic analysis consists of one or more themes that shed light on individuals' encounters, perspectives, and standpoints regarding the phenomenon in question [23]. The quotes were translated into English and validated by two bilingual members of the research team (JL and CW) to ensure that the translated quotes retained not only the syntax but also the original meaning. The data analysis process began with multiple readings, where a single researcher (JL) led the effort to acquaint himself with the data content. The researcher assigned descriptive codes to identified content pieces and subsequently categorized these codes according to similarities and differences. Following this, the researcher engaged in discussions over several sessions to reach a consensus with the rest of the research team and ensure the analysis's rigor and reliability. Through this iterative process, the data was comprehensively examined and interpreted from diverse perspectives, ensuring an accurate representation of participants' experiences.

3.2. Trustworthiness. We relied on the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist [24]. Throughout the research process, we adhered to the rigorous criteria proposed by Guba and Lincoln [25]. We closely and continuously monitored the process to ensure reliability, paying attention to the accuracy of the transcripts, and comparing them with the corresponding audio recordings. In addition, we carefully read the transcripts multiple times to guarantee the fidelity of the content. To ensure the accuracy and validity of the identified categories, two experts in qualitative methodology who were not part of the research team reviewed and confirmed the analytical process and results, which had also been approved by some participants. The research team members made efforts to identify any personal assumptions or preconceptions they may have held and to separate them from the study. The principal investigator was always available for debriefing and addressing any concerns or uncertainties during the process of analyzing the data.

3.3. Ethical Considerations. The study received ethical approval from the Ethics Committee for human and animal experimentation of the Autonomous University of Barcelona. Informed consent was obtained from all participants after providing them with detailed information about the study, including its importance and the procedures for maintaining confidentiality. Pseudonyms were used to ensure anonymity, and participants were assured that their information would be kept confidential, as expressed in the informed consent form. Additional measures were taken to protect participant privacy. All collected data were stored securely and only accessible to authorized members of the research team. Identifying information was kept separate from the main dataset to further preserve anonymity. During data analysis and reporting, aggregated findings were presented to prevent the identification of individual participants. Participants did not receive any financial incentives for their involvement in the study.

TABLE 1: Semistructured interview guide.

Semistructured interview guide
<i>Introduction</i>
Thank you for participating. Can you please start by telling me a bit about yourself and your background as a nurse?
<i>Understanding the impact of COVID-19</i>
How do you currently feel?
How would you describe your mental health today?
What relationship do you think it has with COVID or the pandemic we have experienced?
How has the COVID-19 pandemic affected your work as a nurse?
Can you describe any challenges or difficulties you have faced in your role during the pandemic?
How has the pandemic impacted your mental health and well-being?
<i>Exploring intention to leave the profession</i>
I see that you answered in the previous encounter that you have considered leaving the nursing profession, particularly during the COVID-19 pandemic, can you explain more?
What factors contributed to this consideration?
Can you describe any specific instances or experiences that led to thoughts of leaving the profession?
What factors ultimately influenced your decision to stay in or leave the nursing profession?
<i>Closing</i>
Is there anything else you would like to add or discuss regarding the impact of COVID-19 on your profession and mental health?
Do you have any final thoughts or reflections you would like to share before we conclude the interview?

Ethical guidelines were strictly followed to ensure the protection of participants' rights and well-being throughout the study.

4. Results

4.1. Participant Characteristics. A total of 14 nurses, ranging in age from 27 to 61 years with an average of 22.8 years of work experience, participated in the study (see Table 2). The participant group included representation from all four Catalan provinces, with a majority of female participants. Moreover, the participants came from various professional backgrounds, which contributed to the study's broad range of perspectives.

4.2. Qualitative Results. All respondents reported considering leaving the profession at some point during the sixth and seventh waves of the COVID-19 pandemic. Thematic analysis of the data revealed three main themes: (1) the impact of COVID-19 on health; (2) factors influencing the decision to stay in the profession; and (3) recommendations to improve the management of similar situations (see Table 3).

4.3. The Impact of COVID-19 on Health. The participants reported feeling tired both physically and emotionally. The COVID-19 pandemic revealed the chronically precarious situation of the profession and the healthcare system in general. Nurses were exposed to exhaustive levels of pressure to care for patients as well as emotional fatigue that endangered their health and continuity in the field.

TABLE 2: Sociodemographic data.

Variables	%
<i>Gender</i>	
Man	14
Woman	79
Other	7
<i>City</i>	
Barcelona	43
Tarragona	21
Lleida	21
Girona	14
<i>Professional setting</i>	
Hospital	43
Primary and community care	36
Correctional facility	14
Multiple settings	7

I'm not sure if it was COVID-19 or because of COVID-19 that we realized how poorly we were doing. The arrival of COVID-19 made it clear to us. We had been at a low point for so long that I can't even recall how many years it's been. While COVID-19 is now under control, we remain at a low point, with exhausted, demotivated, and irritable people. The things we went through during the first waves [of the pandemic] are still present, and I have vivid memories of them. I've witnessed individuals pass away [before], but it wasn't simply the act of dying. It was the way in which it all unfolded—the disorder, the terror. To persevere through the initial and second instances was quite the feat, but these more recent waves have been something else entirely. Chaos continues to reign every single day. If—and when—another virus like COVID-19 arises, brace yourselves, because I truly don't think half of us could endure it. (P4)

This reported lingering sense of professional uncertainty, combined with fatigue from the COVID-19 pandemic, led to a sense of disillusionment with the healthcare system, its management model, and nursing practice. Although all participants affirmed that the field has provided them with deep satisfaction, many of them indicated that nowadays, if given the choice, they would pursue a different career path because nursing has changed significantly and does not meet their expectations any longer.

I would choose a different career, like art history or archaeology, if I could go back to high school. I wouldn't pick anything related to health. (P3)

I like being a nurse, but not this [kind of] nurse. (P8)

At work, I did notice the fatigue, and I also got a little burned out. I have come to question my work. (P5)

After five previous waves of COVID-19, study participants faced the sixth and seventh waves with a significant toll taken regarding their physical and emotional health. Episodes of anxiety, depression, insomnia, irritability, and post-traumatic stress are particularly prominent at varying levels of severity. The symptoms of these conditions did not emerge in an acute

situation stabilized and there was no evidence of any change in the management of their precarious working conditions, in addition to a marked shortage of nurses, the participants began to take sick leave and had thoughts of abandoning the profession. The participants admitted that the pressure of the situation did not allow them to leave because they felt guilty. Quitting their jobs meant burdening their colleagues with more work since the possibility of finding replacements was practically nil. Therefore, on numerous occasions, they faced the dilemma of wanting to feel good themselves or sacrificing their well-being to make others feel good.

In January 2021, I began taking medication for anxiety prescribed by my doctor so I could continue going to work. It was either that or take time off due to sickness, but I felt too unwell to do so. I experienced the common feeling of guilt because I believed my colleagues needed me, and I couldn't abandon them. (P12)

However, the nurses acknowledged that to leave the field implies accepting defeat, and this is the chief reason why they remain in the profession, which they initially chose with enthusiasm and which has brought them happiness for many years despite the challenges. In addition, quitting nursing practice would mean losing the few labor rights and privileges they had obtained through their careers (particularly in terms of working hours, facility, and acquired seniority). The nurses were realistic and admitted that they have economic needs they are currently able to meet. They expressed uncertainty about their ability to meet those needs if they were to switch to another profession and start from scratch. As a result, despite their complaints and general dissatisfaction with the situation, they said they prefer to tolerate it rather than face financial instability or difficulties in terms of family reconciliation.

I cannot give up. I still have many years of work ahead of me. It's my job, and I love it. I want more than just applause—I want real recognition. What I've gone through should serve a purpose beyond just keeping me going. (P1)

Then I considered the possibility of moving elsewhere and not being able to balance my work and family life. However, I decided against it because I currently have a schedule that allows me to be with my children and assist them as needed, even if I work on some weekends. If I move to another center, I may lose this routine and stability, which I prefer to maintain (P7).

4.5. Recommendations for Improving the Management of Similar Situations. As for feeling professional fatigue and disillusionment, the nurses felt they were ignored during the pandemic, both at the political level and at the middle/higher levels in their workplaces. One of the participants referred to feeling “*ignored*” and “*belittled*.” Many of the participants expressed this view, revealing a pervasive sense of

disappointment. The nurses acknowledged the exceptional nature of the situation but were highly critical of the management of access to protective materials, work shifts, breaks, and other measures, which were adopted without considering their input. As a result, the management of the situation adversely affected their physical and mental health, leading to dissatisfaction with the profession.

Maybe they're not listening as much anymore. The mid-level managers seem busy, and it seems like the top executives are on their own. They believe we can handle everything, but we can't. Things used to be done differently. Things used to be done a certain way, but we were abruptly informed that they would now be done differently. They didn't directly ask us [for our input], as if we weren't important or weren't being considered. (P7)

We've been experiencing this throughout the pandemic. The authorities take care of themselves, and we have to tolerate whatever they decide, without any consideration for our opinions. We have to accept our situation and move forward. (P9)

I'm okay, but my voice trembles when you ask how I feel. We always say “fine” because there's no time to talk and we've been through too much to complain. But it upsets me and makes me angry that nobody cares how we really are. They applaud us but don't listen to us. (P8)

The participants recognized the need to alter their approach to the profession, including their understanding, management, and even their attitude towards it. They realized the importance of adopting a model of emotional self-management centered on self-compassion and assertiveness over absolute dedication to others. This means placing the person and the professional in the foreground without affecting the quality of care, learning to listen to signs observed in the body, and knowing how to identify when it is necessary to pause without feeling guilty.

We should prioritize carving out more leisure time to pursue personal growth and activities outside of the healthcare field. (P3)

I decided I needed a break and some rest. I [focused on] myself and didn't want to be all over the place anymore. I quit one job and now I have more time for myself. I do acupuncture and yoga to take care of myself. If we only focus on others, we'll spiral downward. Who takes care of you? (P9)

The nurses invited the managers to become more involved with the emotional needs of their teams and to truly assess whether the care facility where they were located was the right one for them. They demanded that vacancies be filled, taking into account the experiences of the

professionals as well as their personal preferences, thus facilitating a work-life balance.

Nursing managers should consider their staff's opinions by asking them if they are content with their current location or if they would prefer a change. This simple gesture can improve employee satisfaction and motivation at work. (P2)

5. Discussion

Our findings indicate that continuous exposure to COVID-19 impacted nurses' self-perceived health and well-being as well as their intention to leave the field. The participants expressed feelings of being ignored, enduring fatigue, and dealing with mental health challenges such as emotional instability, irritability, insomnia, and depression. Our results align with a growing body of evidence that highlights a surge in mental health problems among healthcare professionals during the COVID-19 pandemic [3, 26]. For instance, intensive care nurses experienced helplessness, exhaustion, and mental health issues; moreover, a significant percentage of primary healthcare nurses exhibited symptoms of depression, anxiety, and stress, which they attributed to the pandemic [27], and Martin-Rodriguez et al. [28] reported a significant prevalence of depression, anxiety, insomnia, and distress among nurses, particularly those working in COVID-19 units and nursing homes, who appeared to be particularly affected. Providing a broader context, a systematic review encompassing studies from 2020–2021 showed a high prevalence of moderate-to-severe symptoms of anxiety, depression, PTSD, and insomnia among nurses [3]. These findings collectively underscore the ubiquitous nature of mental health challenges among healthcare professionals during the COVID-19 pandemic.

The nurses felt abandoned by their healthcare institutions. They felt unsupported, especially during the early stages of the pandemic when uncertainty and fear were multiplying. The sense of abandonment expressed by our participants can be linked to the sense of being betrayed found in the literature discussing the concept of institutional betrayal among healthcare workers [29]. In this study, healthcare workers described frustration when their institutions did not prioritize their safety, and they believed that they had received inadequate compensation. Feelings of having been betrayed by their institutions were associated with increased burnout and a stronger intent to quit their jobs [29]. This highlights the critical need for healthcare organizations to foster a supportive and trustworthy environment for their staff, particularly during times of heightened uncertainty, such as during crises.

The present study indicates that nurses experienced significant changes in their working conditions, and they felt disillusioned at the professional level as well as personally transformed. These results align with prior research that has identified similar experiences of professional grief [30], turmoil, and personal transformation [31]. In essence, the present study suggests that nurses are deeply disappointed with the management system and with what the profession

has become. Their profession is no longer recognized, which makes them think they would not choose nursing if they could go back in time and choose a different career. The findings underscore the disillusionment experienced by nurses with the current state of their profession, highlighting the urgent need for systemic changes to address their concerns and restore recognition and value to the nursing profession.

It is important to acknowledge the differences between our findings and those of prior research, where some nurses found renewed purpose and meaning in their roles during the pandemic [32, 33]. These differences may be attributed to the evolving nature of the pandemic, the varying experiences of healthcare professionals at different points in time, and our specific focus on individuals who have contemplated abandoning the profession. The differences in results underline the complexity of nurses' experiences during a crisis as well as the need for further research to better understand the shifting dynamics of nurses' professional lives. However, our findings partly align with those of Litzzen-Brown et al. [32] as their participants described how the circumstances of the pandemic led them to provide suboptimal care. The consequences of this environment and the barriers to providing optimal nursing care had significant ramifications for the nurses, leading to constant feelings of frustration and being at a loss.

Finally, evidence suggests that a challenging work environment, a lack of support, emotional distress, and disappointment regarding the reality of the field were factors that reinforced nurses' motivation to leave the field [34]. This reality points to the urgent need for effective mechanisms to provide mental health support within healthcare organizations, as emphasized by our participants' suggestions for prioritizing personal well-being in future crisis management in order to foster retention.

We identified a number of factors that dissuaded nurses from abandoning the profession such as a sense of responsibility, feelings of guilt, pressure from management teams, economic considerations, and a desire to preserve working conditions. All these factors played pivotal roles in their decisions. In this regard, various factors influencing nurses' intention to stay or leave the field have been highlighted in the literature [9], including education level, mastery and expertise, perceived support, nurse-manager communication, stress levels, and family-related factors such as marital status or having children. These factors emphasize the individualized nature of nurses' decisions regarding their professional future. The interplay between individual motivations and organizational influences is essential in fully addressing nurses' intentions to remain in or leave the profession.

Several studies have examined the pandemic's impact on retention and turnover among nurses. In the present study, economic stability and favorable working conditions influenced nurses' decisions to stay in their roles. Squires [31] suggested that financial incentives, often linked to economic stability, are a driving force behind attrition rates. This highlights the undeniable connection between financial well-being and a nurse's decision to stay in the field,

reinforcing the significance of economic considerations in nurses' career choices. It is important to note that while these factors resonated with our participants' experiences, there is also a degree of variability in how different nurses respond to these pressures. A study among senior nurses in Ireland showed that despite the adverse health impacts, some nurses responded positively to the pandemic, while others chose to retire early [35]. This variability demonstrates the multifaceted nature of nurses' decisions in the face of adversity.

Bahlman-van Ooijen's [34] qualitative systematic review indicates that nurses' reasons for quitting nursing practice include numerous difficulties, including a challenging work environment, emotional distress, disappointment about the reality of nursing, and a culture of hierarchy and discrimination. These findings offer valuable insights into areas where targeted interventions and improvements can be implemented. Furthermore, a longitudinal study conducted across two phases identified emotional states such as moral distress, compassion fatigue, burnout, and PTSD among nurses, which significantly influenced their thoughts of abandoning the profession [5]. The present study emphasizes the need to create a psychologically safe workplace to support retention among nurses. Additionally, frontline nurses experiencing compassion fatigue are at risk of lower job satisfaction and higher turnover intention [36].

In a broader context, the quality of the work environment significantly impacts nurses' risk of burnout and intention to leave the profession, with better work environments being associated with lower risks [37]. This aligns with our findings regarding the importance of preserving favorable working conditions to prevent job abandonment.

In this study, the nurses described the pivotal role of leadership, especially healthcare management, in nurturing the well-being of nurses during crises. Savage et al. [38] underscored the idea that healthcare leadership has the potential to function as both an asset and a barrier to organizational performance. Many participants described how leadership was unsure about how to provide structure and organization during the pandemic. Subsequently, nurses experienced a significant lack of support from leadership staff, such as their managers, who either were unavailable or left their positions. This observation is consistent with prior research highlighting the significance of effective leadership during challenging times [39]. Positive and supportive leadership positively affects nurses' commitment to the organization, leading to increased job satisfaction, productivity, retention, patient safety, and an overall safe climate [40]. Fowler and Robbins [41] emphasized the indispensable role of nursing leaders in enhancing efficiency, stressing the need for these leaders to exhibit both informational and motivational qualities, especially during healthcare challenges and crises. The participants' input demonstrates the critical need for strong, supportive leadership structures within healthcare organizations to mitigate the impact of crises on healthcare workers.

Moreover, the participants stressed the importance of personal growth and self-care as integral components of crisis management. This perspective resonates with the

broader literature on resilience among nursing professionals, which emphasizes personal growth as a key element of their ability to navigate and overcome challenges [42]. The participants' insights suggest that the promotion of personal growth and self-care strategies should be integrated into crisis management plans to help healthcare professionals cope with the emotional challenges they may face. Practical aspects of crisis management were also underlined by nurses participating in the present study. Ball [43] found that nurses advocated for better personal protective equipment and support for the workforce. This pragmatic feedback indicates the importance of addressing tangible concerns to ensure the safety and well-being of healthcare workers during crises.

Finally, this study shows how nurses prioritize personal their well-being. Calkins [44], who identified feelings of inadequacy and exhaustion among intensive care nurses, further highlighted the urgent need for healthcare organizations to develop strategies to mitigate burnout and provide comprehensive support to their staff. The importance of peer support and an encouraging team culture in helping nurses cope with crises has also been emphasized in the literature [45], thus demonstrating the significance of fostering positive interpersonal relationships among healthcare professionals to enhance their resilience during challenging times. In line with this, Squellati and Zangaro [6] stressed the collaborative nature of coping with the demands of the healthcare profession, underlining the need for nurses to work together to support each other and their leaders in mitigating the situation and reducing burnout.

6. Limitations

This study has some limitations. The sampling method ensured the appropriateness of the participant profile in relation to the study's objectives. However, the sample is represented only by some nursing backgrounds and specific clinical settings. Moreover, the nurses participated voluntarily. Consequently, other potential options that could be explored in future studies were left out. This also means that the experiences of nurses who did not express interest in participating may have been overlooked due to challenges associated with their unease with the topic at hand. Nonetheless, the wide range of profiles and the repetition of data ensured their reliability and dependability. Additionally, the data align with the socioeconomic context of the specific context, precluding the possibility of extensive generalization. Nevertheless, we postulate that various outcomes could be applicable in similar populations of healthcare workers worldwide. Finally, there may have been some information bias due to the sensitive nature of the subject matter. Nevertheless, we took measures to reduce this and establish a safe environment of confidentiality and nonjudgment for the interviewees.

7. Future Research

For future research, conducting in-depth studies that focus on nurses who have left the profession could provide

valuable insights into their experiences and reasons for departure. Understanding these factors in greater detail can inform targeted interventions and support strategies aimed at retaining healthcare professionals within the workforce.

Implementing action research methodologies could be beneficial in assessing the effectiveness of interventions designed to address nurses' concerns and improve retention rates. Action research principles, such as collaboration with stakeholders and iterative cycles of planning, action, and reflection, can actively involve nurses in the process of identifying and implementing solutions. This approach enables real-time adjustments based on feedback from participants, promoting a sense of ownership and engagement among healthcare professionals.

Additionally, taking into account the diverse backgrounds and experiences of nurses could improve the effectiveness of interventions. Customizing strategies to accommodate different needs and perspectives within the nursing workforce can result in more targeted and impactful solutions. By integrating insights from in-depth studies of nurses in this situation with action research methodologies, researchers can develop evidence-based strategies to address workforce challenges and enhance the sustainability of the nursing profession.

8. Conclusions

The emotional impact of the pandemic on the interviewed nurses was profound as they struggled with feelings of being overlooked, exhaustion, and mental health challenges. Despite the immense obstacles they faced, they demonstrated dedication to their field and professional commitment. Factors such as a sense of responsibility, guilt, and the importance of economic stability played pivotal roles in their decision to persevere. This resilience highlights the interconnections among personal motivation, organizational support, and economic stability in shaping career decisions during times of crisis.

There is an urgent need for comprehensive programs offering mental health support that are tailored to the unique demands of nursing. Recognizing and addressing emotional challenges must become a cornerstone of future crisis preparedness and response efforts. Apart from designing strategies to cope specifically with the effects of the COVID-19 pandemic on nurses, this study suggests the need for managers and decision-makers to propose sustainable actions that could overcome potentially similar situations. In addition, nurses' working conditions should be reviewed so that they can be retained and kept healthy, thereby avoiding situations of fatigue, stress, the intention to leave, and low motivation. Such circumstances have led to a worldwide nursing shortage and have hampered upward mobility to workplaces with better conditions.

Finally, policies and programs should be implemented at the management level that prioritize nurses' mental well-being and recognize their invaluable contributions. This multidimensional approach should include mental health support, leadership development, personal growth, and a culture of appreciation within healthcare organizations. By

investing in nurses' well-being, we not only honor their dedication but also strengthen their resilience, ensuring that they can continue to deliver high-quality care during times of adversity.

Data Availability

The narrative data used to support the findings of this study have not been made available because of ethical reasons.

Additional Points

Statement of Clinical Relevance. This study highlights the emotional impact of the COVID-19 pandemic on nurses and identifies critical factors that influence their intention to abandon the profession. Healthcare organizations can improve the well-being of their nursing staff, reduce turnover intentions, and ensure a resilient and dedicated workforce capable of delivering high-quality care, especially in times of crisis, by addressing these issues. Recognizing these challenges is crucial for healthcare administrators and policy-makers to implement targeted strategies for improving working conditions. Prioritizing mental well-being policies and fostering a culture of appreciation are essential for sustaining nursing excellence during adversity.

Disclosure

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Factors Contributing to Time-Wasting Activities among Palestinian Nurses: A Cross-Sectional Study

Raj'a Nayef Zyoud 

Arab American University-Palestine, P.O. Box 240, 13 Zababdeh, Jenin, State of Palestine

Correspondence should be addressed to Raj'a Nayef Zyoud; raja.zyoud@aaup.edu

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Background. Nurses face significant challenges as they attempt to manage an increasing number of complex responsibilities within limited time frames. This article explores the factors contributing to time-wasting behaviors among nurses in Palestine and emphasizes the significance of effective time-management skills in nursing practice. **Methods.** Surveys were collected from a total of 714 nurses working in multiple healthcare facilities located in the north of the West Bank, Palestine. An 11-item time-wasting scale was developed and validated. Factors influencing time-wasting behaviors among nurses were then investigated using multiple linear regression in SPSS version 25. **Results.** Attending time management courses significantly reduced time-wasting behaviors. Additionally, factors such as age, gender, and educational level did not appear to correlate with time-wasting behaviors. However, workplace, type of organization, and attendance of time management courses did impact nurses' time management skills. **Conclusion.** This article underscores the importance of time management skills in nursing practice. Inefficient time management can have detrimental effects on patient care and nursing outcomes. To mitigate these challenges, healthcare institutions and nursing education programs should prioritize time management training for nurses.

1. Introduction

Nurses face ongoing challenges as they try to handle a growing number of complex tasks and demanding work conditions within the constraints of limited time [1]. In a mixed-methods study conducted in Palestine, [2], a nurse captured the challenges they encounter while endeavoring to address the requirements of all their patients: "You cannot give quality when you are overwhelmed with quantity. When I have 15 patients on a ward to take care of on a night shift, I barely have time to distribute the medications, leaving little time to care for patients' other needs." According to Saintsing et al. [3], nurses indicated that time limitations constrained their capacity to conduct thorough patient assessments. Around 80% of entry-level nurses acknowledged making errors due to time pressure. Managing time efficiently and avoiding time-wasting activities are therefore essential in the nursing work environment. The lack of time management and organizational skills was also related to inequities in health service provision and distribution [4].

Causes of time-wasting behaviors among nurses include a lack of effective time management skills. This includes not setting short- and long-term goals, failing to organize tasks, engaging in activities that waste time, and lacking knowledge and experience in setting priorities [5, 6].

Consequences of time-wasting behaviors include ineffective work performance, decreased productivity, and the potential for missing essential nursing care tasks [5]. Nurses who wasted their time and energy on social media and low-priority tasks were found to significantly lower their work performance [7]. Not knowing how to set priorities by giving equal attention to major and minor problems can have dire consequences on patients' health and overall nursing outcomes [8].

Numerous studies have consistently demonstrated a detrimental impact of ineffective time management on job performance [9, 10]. Tang and Vandenberghe [11] explained that demands that exceed an individual's available resources contribute to a decline in overall work performance and well-being. Others found that work overload negatively

affects performance through increasing stress [10]. A cross-sectional study from Brazil revealed that work-related stresses had the greatest negative impact on job performance while social networks and job autonomy had the greatest positive impact [12].

A study by Knezevic et al. [13] investigated the effects of time management skills on job satisfaction for nurses. The study found that poor time management skills were significantly associated with lower job satisfaction levels among nurses. In a related study, Ozkan & Timbil [14] found that nurses with poor time management skills made more medication errors and missed nursing care activities more frequently than those with good time management skills. The authors recommended that time management training should be included in nursing education to improve patient safety and quality of care.

Similarly, a study by Cleland Woods et al. [15] found that poor time management skills were associated with higher levels of job-related stress among nurses. The authors recommended incorporating time management training into workplace wellness programs to help nurses manage their time more effectively and reduce job-related stress. In conclusion, poor time management skills can have negative effects on nurses' capacity to provide optimal patient care. It is, therefore, essential that time management skills are included as a critical component of nursing education and workplace wellness programs.

Numerous studies, including those conducted by Hamzehkola and Naderi [16], Higazee et al. [17], Ebrahim et al. [18], and Elsbahy et al. [19], have presented sound evidence that time management interventions can enhance the organizational skills of nurses, mitigate work-related stress levels, and ultimately elevate the overall quality of their work. A time management educational program for head nurses in Iran assessed improvements in five essential time management skills (setting goals, setting priorities, time mechanics, time control, and organizing time). The results showed dramatic improvements in these basic skills after the educational intervention [20].

Another quasi-experimental experiment of 60 nurses from all hospital wards in Tehran examined the psychological and social impacts of a one-day educational workshop on strategies to improve time management and avoid wasting nursing time [16]. A pretest was followed by a posttest one month after the workshop. Results showed significant improvements in psychological well-being and trust among staff.

Setting priorities has been defined as the action of assigning precedence in rank with regard to the importance or time for some activities over others [8]. In addition to delaying activities of less importance, prioritization can also eliminate unnecessary tasks which allow nurses to allocate more precious time for patients [16]. These findings underscore the importance of time management skills for nurses. Prioritizing tasks and activities are crucial aspects of time management skills.

It has been noted that new nurses struggle with managing their time and that their abilities to prioritize tasks and minimize time-wasting activities improve with experience [21].

The degree to which this relationship is a function of experience, age, education, or other variables that evolve with time has not been extensively investigated in previous research [22]. Many studies show that time-wasting activities decrease with age, education, experience, and attending time-management courses. Most of the previous research, however, did not adjust for confounding effects in multivariate analyses [23]. The current study aims at exploring the relationships between these background variables and time-wasting behaviors in multivariate models to distinguish the most important factors contributing to time-wasting behaviors.

1.1. Principles of Setting Priorities. The fundamental question is how can nurses determine the priority, importance, and urgency of the multitude of tasks they are tasked with? Several time management theories and models can help nurses in managing their time and minimizing time-wasting activities. The items used in the time-wasting scale of this study such as appreciating planning, distinguishing important tasks, and understanding time-wasting activities reflect those principles. Those principles include

- (1) The Pareto 80/20 rule notes that 80% of outcomes result from 20% of efforts [24]. This principle calls for identifying and focusing on the most impactful tasks, i.e., the ones that yield the highest returns. The 80/20 rule therefore prioritizes the 20% of tasks that produce the best results.
- (2) The two-minute rule recommends completing small tasks (e.g., those requiring 2 minutes or less) first before embarking on tasks that are complicated or require long durations [25]. This rule helps minimize the accumulation of small tasks and fosters a sense of progress.
- (3) The effort impact matrix, also known as the PICK Chart, prioritizes tasks based on impact and effort [26]. The impact can be assessed based on financial gain, patient satisfaction, or health improvement. The impact or yield of a task ranges from low to high.
- (4) The ABC method involves categorizing tasks based on their priority and then completing the highest priority tasks while less urgent tasks can be delayed or delegated [27].
- (5) Eisenhower matrix categorizes tasks based on their urgency and importance into four quadrants: (a) urgent and important, (b) important but not urgent, (c) urgent but not important, and (d) not urgent and not important. The model helps prioritize tasks and focus on the most critical ones.

Nursing time management skills are essential for delivering efficient and effective patient care. Poor time management skills can lead to decreased patient satisfaction, inefficient use of resources, and ultimately compromised patient care [14]. Therefore, this study aimed to investigate sociodemographic and institution-level factors associated with time-wasting behaviors among nurses in Palestine. Specifically, the research questions were whether time-

wasting behaviors vary by nurses' age, gender, place of residence, and educational levels. Of interest were the effects of institutional-level factors such as type of healthcare institution (public versus private), facility size (hospital versus clinic), and teaching status (teaching versus nonteaching institutions) on time-wasting activities. The impact of attending a time-management course on time-wasting behaviors was also investigated.

2. Methods

The surveys were collected in the period between March and August 2019 from 714 nurses working in 17 hospitals and multiple primary health care clinics in the North of the West Bank of Palestine. Approval was obtained from the Palestinian Ministry of Health. The researcher contacted the nursing directors of each hospital and primary healthcare center, inquiring about the number of nurses employed within their respective organizations. Subsequently, the researcher prepared questionnaires based on the gathered information, met with each nursing director in person, delivered the questionnaires, and explained the data collection process, including its content, objectives, and the process of obtaining consent.

The nursing directors were then tasked with distributing the questionnaires to all nurses in their organizations and collecting the completed questionnaires within a week. The researcher personally collected the completed questionnaires from the nursing directors. All nurses completed the questionnaires except those who were sick or on leave.

Inclusion criteria: all male and female staff and practical nurses who were available at the time of the data collection. Exclusion criteria: nurses who were on a sabbatical leave, a sick leave, nurse volunteers, and internship student nurses. The entire process was completed within a span of six months, and the researcher, along with the assistance of two experienced data entry personnel, entered the data into SPSS version 25. The collected data were analyzed using *t*-tests and ANOVA. To account for confounding effects, multivariate linear regression was employed.

2.1. Study Instrument. The study examined various socio-demographic variables including gender, age, residence, educational level, and years of experience. Time-wasting behaviors were evaluated using an 11-item scale developed based on prior research [28]. This scale measures different aspects of time-wasting behaviors, such as excessive grooming, poor planning, failing to distinguish between important and unimportant tasks, underestimating task completion time, excessive use of social media, and excessive socialization. Responses were recorded on a 5-point scale ranging from "never = 1" to "always = 5" and a summative score was computed. Scores could range from a minimum of 11 to a maximum of 55, with higher scores indicating more frequent engagement in time-wasting activities.

The face and content validity of the study were ensured through consultations with 10 experts in nursing and time management. These experts were briefed on the study's

objectives and the construct of the scale. They were then asked to assess whether the items clearly and effectively measured their intended concepts (face validity). Additionally, the experts provided feedback on the relevance of the items and their representation of the content domains within the intended construct.

The author carefully analyzed the feedback received from the experts and made necessary adjustments to the wording and number of items. Subsequently, the revised questionnaire was pilot-tested with a group of 5 staff nurses. Construct validity was evaluated through factor analysis, and reliability was assessed using Cronbach's alpha.

3. Results

Cronbach's alpha of the entire sample was 0.862, indicating good internal consistency. Factor analysis identified three distinct factors, as detailed in Table 1. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.845, indicating strong partial correlations among the variables and justifying the use of factor analysis. Bartlett's test of sphericity returned a *p* value of less than 0.001, which rejects the null hypothesis that the variables are unrelated. This indicates that the correlation matrix is not an identity matrix, affirming the appropriateness of factor analysis. None of the items had a commonality value above 0.4, indicating the appropriateness of factor analysis for exploring the data. Overall, the three-factor structure accounted for a substantial 76.77% of the variance in the nursing time management scale.

The divergent validity of the scale was assessed by correlating it with another scale which is theoretically intended to measure good time management behaviors among nurses. The time nursing wasting scale correlated negatively with the nursing time managements scale (NTMS), correlation coefficient = -0.162 , $p < 0.001$. The NTMS is a scale that measures positive time management skills among nurses such as planning, goal setting, and coordination of activity (Table 1).

The factor loadings, means, and standard deviations for each item within the time-wasting scale are displayed in Table 2. Higher mean values indicate more frequent engagement in time-wasting behaviors among the participants. Among the various behaviors, grooming appeared to be the least time-consuming activity, with a mean score of 2.14. In contrast, work interruptions, such as being overly accessible, ranked as the most significant time-wasting factor, with a mean score of 3.15. Following closely were behaviors like not having specific time to respond to emails and phone calls (mean of 3.03) and continuously checking emails and other communication media (mean of 2.83).

The factor analysis unveiled a three-factor model, categorizing time-wasting behaviors into three dimensions:

- (1) Inability to plan and organize tasks
- (2) Improper use of technology and social media
- (3) Excessive socialization

Table 3 shows the frequencies and means of the time-wasting scores by background variables. Of the 714

TABLE 1: Correlation between the time-wasting scale and NTMS.

		NTMS	Time-wasting scale
NTMS	Pearson correlation Sig. (2-tailed)	1	
Time-wasting scale	Pearson correlation Sig. (2-tailed)	-0.162** 0.000	1

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

TABLE 2: Factor loading, means, and SD for each question in the time-wasting scale.

	1	2	3	Mean	SD
You spend more time with personal grooming than doing nursing work	0.81			2.14	1.30
You do not understand time planning	0.89			2.24	1.38
You cannot distinguish what is important from what is not	0.90			2.22	1.39
You underestimate time and effort needed to accomplish tasks	0.89			2.23	1.37
You are on Internet access all the time during the day		0.75		2.62	1.37
You check and respond to so many different communication mediums (e-mail, voice mail, others)		0.79		2.83	1.37
You have assigned times to respond to phone calls or emails, reversed		0.73		3.03	1.33
You make yourself overly accessible		0.76		3.15	1.37
When someone is talking and not getting to the point, you interrupt him and search for truth			0.84	2.37	1.19
You are brief when talking, reversed			0.88	2.37	1.17
When you are busy, you give appointments when you are free, reversed			0.84	2.41	1.16

TABLE 3: Time-wasting scores by background variables, $N = 714$.

	<i>n</i>	%	Mean	SD	<i>P</i>
<i>Gender</i>					
Male	249	34.8	28.02	7.02	0.223
Female	465	65.0	27.38	6.42	
<i>Age</i>					
Less than 25	201	28.1	28.16	6.69	≤0.001
25–35	200	28.0	28.79	7.20	
More than 35	313	43.8	26.50	6.05	
<i>Residence</i>					
City	352	49.2	27.00	6.54	0.020
Village	299	41.8	27.98	6.64	
Camp	63	8.8	29.25	6.86	
<i>Educational level</i>					
Technical	271	37.9	27.66	6.87	0.973
Bachelor	409	57.2	27.58	6.51	
Master or above	34	4.8	27.41	6.39	
<i>Workplace</i>					
Hospital	518	72.4	28.53	6.96	≤0.001
Patient community clinic	196	27.4	25.17	4.94	
<i>Type of organization</i>					
Government	537	75.1	26.31	6.51	≤0.001
Private	177	24.8	31.53	5.36	
<i>Current job position</i>					
Nurse	631	88.3	27.53	6.59	0.342
Nurse supervisor	82	11.5	28.27	6.99	
<i>Job experience</i>					
Less than 5 years	225	31.5	28.24	6.65	0.003
Between 5 10 years	165	23.1	28.55	7.09	
More than 10 years	324	45.3	26.69	6.28	
<i>Teaching hospital/clinic</i>					
Yes	396	55.4	26.59	6.93	≤0.001
No	318	44.5	28.88	6.01	
<i>Attended time management course</i>					
Yes	415	58.0	27.00	6.88	0.004
No	299	41.8	28.44	6.19	
<i>Total</i>	714				

The bold values are statistically significant. Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

participants, 34.8% were male and 65.0% were female. The mean time-wasting score for male participants was 28.02, and for female participants, it was 27.38, $p = 0.223$. The average time-wasting score of nurses over the age of 35 is higher than younger age groups, $p < 0.001$. The mean time-wasting score was highest for participants living in the camp (29.25) and lowest for those living in the city (27.00).

Regarding workplace, the table shows that the mean time-wasting score was significantly higher for participants working in a hospital (28.53) compared to those working in a patient community clinic (25.17) ($P < 0.001$). For this type of organization, the mean time-wasting score was significantly higher for participants working in a private organization (31.53) compared to those working in a government organization (26.31) ($P < 0.001$).

Regarding the current job position, the table shows that 631 participants (88.3%) were nurses, while 82 participants (11.5%) were nurse supervisors. The mean time-wasting score was similar across the two job positions, with no statistically significant difference ($P = 0.342$). Participants who worked in teaching hospitals/clinics had a lower mean time-wasting score (26.59) than those who did not work in teaching hospitals/clinics (28.88), and those who attended a time management course had a slightly lower mean time-wasting score (27.00) than those who did not attend a time management course (28.44).

The multivariate linear regression in Table 4 shows no significant relationship between time wasting and gender, age, place of residence, educational level, and job experience. On the other hand, place of work emerged as a significant predictor of the time-wasting score when other background variables were considered. Individuals working in community clinics have lower time-wasting average scores compared to those working in hospitals ($B = -3.2$, $p < 0.001$).

The type of organization was also a significant predictor of time management skills. Individuals working in private organizations engaged in more time-wasting activities compared to those working in government organizations ($B = 4.09$, $p < 0.001$).

Nurses in nonteaching hospitals are more likely to engage in time-wasting activities than nurses in teaching hospitals ($B = 2.63$, $p < 0.001$). Nurses who had not attended a time management course obtained a higher score on the time-wasting scale compared to nurses who had attended a time management course ($B = 3.11$, $p < 0.01$).

4. Discussion

This research sought to examine the predictors of time-wasting behaviors among nurses. The results indicate that time-wasting behaviors are influenced by individual-level and organizational-level factors. The finding that attending a time management course is effective in reducing time-wasting activities and improving time management skills corroborates numerous previous studies that have provided evidence for the positive impact of time management training [19, 22, 29–31].

Prior studies have demonstrated that time-wasting activities decrease with age [22]. In the current study, older age

was associated with lower time-wasting scores in the bivariate analysis, but this association did not hold in the multivariate analysis, most likely due to adjustments for confounding variables such as seniority or job experience. Similarly, job experience was associated with lower time-wasting scores in the bivariate analysis, but this relationship did not persist in the multivariate analysis. This finding contradicts previous research, which found significant correlations between years of experience and improved time management skills [23]. Educational level, however, was not associated with time-wasting behavior in this study. This result aligns with findings from a study in Bangladesh that failed to establish a relationship between educational level and time management skills [32]. In contrast, a study in Iran found significant positive correlations between time management skills and age, education, job experience, and managerial experience, probably because this study did not adjust for potential confounding effects [16].

Organizational types, such as hospital vs. community clinic or government vs. private, were strongly statistically related to time-wasting scores in this study. This suggests that organizational-level factors could influence time-management behaviors. Elsayed et al. [23] reported that organizational factors, such as understaffing, work overload due to a large number of visitors, and the absence of clear management plans, strongly influence employees' time management behaviors. Others have found that poor organizational and policy factors, such as frequent staff meetings, inefficient and unclear communications, and excessive administrative work, such as writing attendance records or tasks unrelated to their specialty, can result in significant time wastage among employees [33].

Time-wasting activities, as reported by nurses in this and previous studies, include spending too much time on low-priority tasks; treating everything as urgent; inability to say "no" to extra work; and excessive interruptions by people and colleagues [34]. Meetings that are ineffective, with no clear purpose, agenda, or follow-ups are a waste of time as well as arriving at meetings late. Other time-wasters include excessive socializing, phone calls, and phone interruptions; inefficient and unclear communications with patients and colleagues; insufficiently detailed policies and procedures; reluctance to delegate tasks; and an overload of paperwork [34].

Not knowing how to prioritize, plan, and handle interruptions can lead to increased errors and work inefficiencies [35, 36]. The findings from this study concur with previous research, which shows the inability of nurses to say "no" as one of the most important factors negatively influencing nurses' workflow [19, 35]. It is known that in Arab culture, saying "no" or "I do not know" is not commonly used, probably because such terms are thought of as impolite. Nevertheless, nurses should learn to refuse additional tasks that they cannot perform or tasks that interrupt their workflow. Other major time-wasters mentioned in previous research include not knowing how to delegate. Figure 1 illustrates a theoretical framework of the types, causes, and consequences of time wasting in the nursing profession. The figure summarizes the findings from this article and previous studies.

TABLE 4: Multivariate linear regression of time-wasting score by background variables, N = 714.

	B	P	95% CI
<i>Gender</i>			
Male	ref		
Female	0.44	0.392	-0.573 1.460
<i>Age</i>			
Less than 25	ref		
25–35	1.00	0.115	-0.245 2.244
More than 35	0.52	0.478	-1.976 0.926
<i>Residence</i>			
City	ref		
Village	0.53	0.274	-0.423 1.490
Camp	1.05	0.209	-0.591 2.692
<i>Educational level</i>			
Technical	ref		
Bachelor	0.76	0.129	-0.222 1.734
Master or above	0.73	0.526	-1.528 2.988
<i>Workplace</i>			
Hospital	ref		
Patient community clinic	3.02	≤0.001	-4.360 -1.675
<i>Type of organization</i>			
Government	ref		
Private	4.09	≤0.001	2.925 5.246
<i>Current job position</i>			
Nurse	ref		
Nurse supervisor	0.74	0.340	-0.785 2.273
<i>Job experience</i>			
Less than 5 years	ref		
Between 5 10 years	0.20	0.761	-1.082 1.478
More than 10 years	0.34	0.638	-1.085 1.768
<i>Teaching hospital/clinic</i>			
Yes	ref		
No	2.63	≤0.001	1.644 3.626
<i>Attended time management course</i>			
Yes	ref		
No	3.11	0.002	0.576 2.556

The bold values are statistically significant. Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

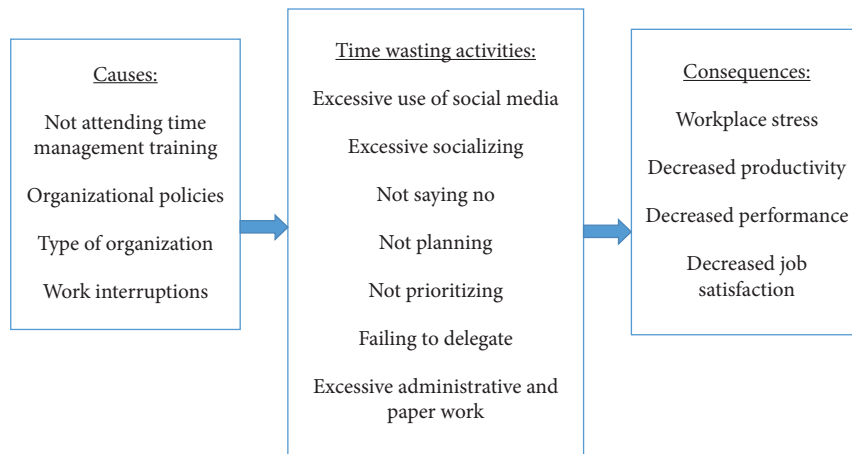


FIGURE 1: A theoretical framework of types, causes, and consequences of time-wasting behaviors.

4.1. *Limitations.* While this study was carried out on a representative sample within the northern regions of Palestine, it is important to note that generalizing the

findings to other contexts may not be fully established. To strengthen the generalizability of the findings, it is necessary to conduct further research in various other contexts.

Moreover, as a cross-sectional study, causal inferences are constrained. Nevertheless, one strength of this study lies in its high sample size, addressing the constraints associated with smaller sample sizes in earlier research.

Although having the nursing directors distribute and collect the surveys has increased response rates and motivation to complete the questionnaires with precision, it cannot be ruled out that some respondents may have been unduly influenced to participate despite the fact that it was explained to them that participation is voluntary.

5. Conclusions

According to the results of this research, providing time management courses to nurses can be an effective strategy to reduce time waste and improve work quality. However, in addition to providing time management courses, hospitals and clinics should also consider implementing organizational policies and strategies to reduce time-wasting activities.

5.1. Recommendations. Hospitals and clinics should conduct regular time management courses for their employees, with an emphasis on providing practical instructions and exercises on how to avoid and eliminate time-wasting activities such as interruptions, distractions, and procrastinations. In addition, organizations should design policies that minimize time-wasting activities, such as requiring excessive reporting, vague communications, and unnecessary meetings. Such policies should be clearly communicated to all employees.

In addition to time management courses, organizations should also provide their employees with the necessary tools and resources to manage their time effectively, such as time-tracking software or prioritization frameworks. By following these recommendations, hospitals and clinics can create a more productive work environment and improve the quality of care they provide to their patients.

Data Availability

The dataset examined in the present study can be obtained from the corresponding author upon a reasonable request.

Ethical Approval

Nurses were informed that participation in the questionnaire is optional and that no adverse consequences will arise from choosing not to participate. They were assured that their names would not be gathered and data confidentiality would be maintained by securely storing the questionnaires solely for research purposes.

Consent

Informed consent was acquired from all participants, including staff nurses and nursing directors. Ethical approval to conduct this study was obtained from the IRB of the American Arab University, Palestine IRB #13.P.E/22.

Conflicts of Interest

The author declares that there are no conflicts of interest.

Authors' Contributions

RZ completed this article.

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Research Article

Factors Influencing Hospital Nurses' Workplace Bullying Experiences Focusing on Meritocracy Belief, Emotional Intelligence, and Organizational Culture: A Cross-Sectional Study

Insil Jang ¹, Sun Joo Jang ² and Sun Ju Chang ²

¹Department of Nursing, Chung-Ang University, Seoul, Republic of Korea

²College of Nursing, The Research Institute of Nursing Science, Seoul National University, Seoul, Republic of Korea

Correspondence should be addressed to Sun Joo Jang; ansley1@snu.ac.kr

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Aims. To identify the factors influencing hospital nurses' workplace bullying experiences (victim and perpetrator aspects) focusing on meritocracy beliefs, emotional intelligence, and organizational culture. **Background.** Workplace bullying remains a major issue in nursing despite decades of research and policy-making. Therefore, comprehensively understanding the individual and institutional factors affecting workplace bullying from both the victim and perpetrator perspectives is crucial. **Methods.** In October 2022, 379 nurses working in South Korean tertiary hospitals were surveyed using a self-reported online questionnaire. Meritocracy beliefs, emotional intelligence, workplace bullying experiences, and nursing organizational culture were measured using the Meritocracy Belief Scale, Wong and Law Emotional Intelligence Scale, Negative Acts Questionnaire-Revised, and Positive Nursing Organizational Culture Measurement Tool, respectively. **Results.** Gamma regression analysis revealed that, for workplace bullying, the factors influencing the victim aspect were the experience of witnessing bullying in the workplace, organizational culture, and meritocracy beliefs. In contrast, the factors affecting the perpetrator aspect were emotional intelligence, meritocracy beliefs, and experience of bullying at work. **Conclusion.** Decreasing nurses' degree of meritocratic hubris in a positive organizational culture and increasing their emotional intelligence are necessary to prevent and intervene in workplace bullying. **Implications for Nursing Management.** Targeted approaches are needed to address and mitigate the detrimental effects of factors influencing workplace bullying. These approaches could include interventions that improve nurses' emotional intelligence, assess their level of meritocracy beliefs, and offer opportunities for self-reflection on meritocratic hubris. Such initiatives may be necessary to effectively tackle workplace bullying and promote a healthier nursing work environment.

1. Introduction

Workplace bullying has remained an ongoing problem in nursing for the last four decades and threatens to persist in the future [1, 2]. It results in negative consequences for individual nurses, patients, and organizations worldwide [1, 3]. The factors that cause workplace bullying are diverse, and to understand workplace bullying in the nursing profession, integrating both individual disposition and institutional factors is necessary [4]. According to a cross-cultural scoping review [5] and a systematic review [6], the factors influencing workplace bullying among nurses are divided into two levels, individual and institutional. For

individual-level antecedents of workplace bullying, demographics (gender, age, marital status, working experience, education level, etc.) and personality traits were reported. Institutional-level antecedents included work characteristics, such as work overload, staffing, working condition, leadership style, and organizational culture. These two types of factors are not mutually exclusive; thus, workplace bullying is often perceived as an outcome of interactions between these two factors [7]. In this study, as potential factors affecting workplace bullying, we focused on meritocracy and emotional intelligence at the individual level and organizational culture at the institutional level. Previous studies have mainly been limited to the victim aspects of workplace

bullying, largely ignoring perpetrator aspects [2]. In the few studies on perpetrator aspects, in line with the incivility spiral effect [8], it was only found that the more workplace bullying was experienced, the higher reciprocated perpetration [9]. In this regard, identifying factors associated with workplace bullying victim and perpetrator aspects and creating intervention plans for both aspects are necessary in nursing management [2, 10]. This study integrates discussions from the perspectives of both victims and perpetrators regarding workplace bullying among nurses.

Meritocracy is a concept proposed by Young [11], referring to a fair and equitable system of gaining resources, status, and rewards based on individuals' intelligence, abilities, achievements, and efforts. In the nursing context, it refers to the idea of promoting and advancing nurses based on their skills, knowledge, and contributions to the field [12]. Contemporary youth highly value processes linked to ability [13]. The combination of meritocracy and fairness is known as "meritocratic justice," which refers to the expectation of achieving fairness based on meritocracy [14]. The meritocratic justice is associated with the perception that acquiring resources and status based on ability or effort is justifiable [15]. Furthermore, meritocratic belief refers to a strong belief in the expectation of achieving fairness based on meritocracy. This belief can lead to a preference for intense competition and decreased sensitivity to inequality [15]. Consequently, meritocratic beliefs may cause nurses to attribute their success or desirable behavior to internal factors such as ability or effort, while blaming external factors such as luck or situational idiosyncrasies for their failures or undesirable behaviors. According to a longitudinal study [16], endorsing meritocratic beliefs during their youth has affected their own socioeconomic status across their life span. Such attributions can hinder mutual understanding and potentially contribute to workplace bullying among nurses. Moreover, meritocratic beliefs may lead to the exclusion or devaluation of individuals who do not fit traditional merit-based criteria [17]. This can be explored in the nursing context by examining how meritocratic ideals inadvertently perpetuate inequality or hinder diversity and inclusion in the profession. Based on these backgrounds, we hypothesized that stronger meritocracy belief can influence workplace bullying experiences from the perspectives of both victim and perpetrator (hypothesis 1).

Emotional intelligence encompasses the ability to monitor and comprehend one's own emotions, as well as those of others, and utilize this information to guide decision-making and actions [18]. In healthcare professions, high levels of emotional intelligence have positive effects on compassionate care and nursing performance [19, 20]. Extensive research has established a correlation between nurses' emotional intelligence and important aspects of their practice, including person-centered care [21], nursing productivity [22], and nursing care quality [23]. Additionally, emotional intelligence contributes positively to the performance of caring roles among nurses in multispecialty hospital settings [24]. Notably, emotional intelligence enables the effective management of both patients' needs and

demands within work relationships, leading to increased collaboration among nurses [18, 25]. Nurses with a low profile of emotional intelligence may become perpetrators of workplace bullying [10]. Nurses themselves acknowledge the importance of emotional intelligence as a quality that underpins their effectiveness as healthcare professionals and leaders, aids the understanding of others' needs and concerns, and facilitates individualized care [26]. Consequently, emotional intelligence can mitigate or prevent workplace bullying by promoting an understanding of one's own emotions, as well as the emotional dynamics among fellow nurses. We hypothesized that lower emotional intelligence significantly contributes to workplace bullying experiences from the perspectives of both victim and perpetrator (hypothesis 2).

Nursing organizational culture refers to the shared values, beliefs, and behaviors among nurses within an organization that are acquired by and transmitted to colleagues and significantly shape thoughts and actions [27, 28]. It has been identified as a crucial organizational factor that influences workplace bullying [29, 30]. Nurses who are bullied may passively accept or endure bullying because of the belief that reporting it will be ineffective, thereby highlighting the cyclical nature of bullying fostered by ingrained organizational cultures [31]. Different types of organizational cultures—such as those that are relationship-oriented, hierarchical-oriented, performance-oriented, and innovation-oriented—have significant effects on workplace bullying [29, 32, 33]. Positive organizational culture among tertiary hospital nurses was associated negatively with the workplace bullying victim aspect [10]. Thus, we hypothesized that a less positive organizational culture can influence workplace bullying experiences from both victim and perpetrator perspectives (hypothesis 3).

Addressing bullying is crucial given its prevalence and impact on unhealthy work environments [5]. In addition, with the increasing use of social media platforms and internal communication systems in hospitals, both face-to-face bullying and cyberbullying have become more prevalent [28]. According to a systematic review on interventions for nurses' workplace bullying [34], all the interventions enhancing communication skills, interpersonal relationships, assertiveness, trust, and empowerment were effective. These strategies enhancing self-reflection and empathy can be introduced to solve interpersonal conflicts and workplace bullying [34, 35], and are in line with developing effective interventions identifying meritocracy and emotional intelligence as factors affecting workplace bullying is crucial. Furthermore, the goal was to gain insights into the dynamics of workplace bullying in terms of victim and perpetrator aspects and contribute to the development of effective intervention strategies for creating healthier and more supportive nursing environments.

2. Materials and Methods

2.1. Study Design. A cross-sectional survey was conducted in accordance with the STROBE guidelines [35].

2.2. Participants and Data Collection. The inclusion criteria were as follows: (1) nurses working at tertiary hospitals in South Korea, (2) incumbent nurses providing direct and indirect care, and (3) nurses belonging to the nursing department. The exclusion criteria were as follows: (1) nurses working at secondary- or lower-level hospitals, and (2) newly graduated nurses in their probationary period (less than three months) considering that nurses are under special protection, supervision, and guidance of the nurse manager. Healthcare professionals in tertiary care settings are required to be highly specialized and experienced [36, 37]. They are exposed to risks of high levels of work stress and burnout [38] and are prone to experience workplace bullying. Considering known antecedents of workplace bullying among nurses [5], we have limited the institution level to tertiary hospitals. This study was conducted through an online survey using a link; there was no restriction on participants' geographical location (including all regions of South Korea).

To determine the required sample size for multiple regression analysis, the researchers utilized the software G*Power 3.1.9.2, with a significance level of 0.05, a power ($1-\beta$) of 0.80, 13 predictors, and an effect size (f^2) of 0.06 [10]. The calculated minimum sample size was 309. Considering a potential dropout rate of approximately 10% based on a previous online research study [39], the researchers posted an online survey link on the online community for nurses most frequently visited as an open call invitation. A warning was displayed to the participants not to respond more than once. Data collection occurred between October 27 and November 1, 2022, with a target of 345 participants. Although 440 responses were collected, the analysis included 379 participants after excluding 45 who were not workers at a tertiary hospital and 16 who were not belonging to the nursing department. All respondents received a coffee voucher after completing the online survey (worth \$5).

2.3. Ethical Considerations. After receiving approval from the institutional review board of the authors' university (approval number: blinded for review, granted on September 7, 2022), the study was conducted in accordance with the guidelines outlined in the Declaration of Helsinki. To ensure ethical considerations, the research participants were provided with a comprehensive explanation detailing the research purpose, methodology, assurance of anonymity, option to withdraw from participation at any point if desired, and commitment to destroy all related information upon completion of the study. Following the provision of this information and electronic informed consent, the participants completed a questionnaire as part of the research process.

2.4. Instruments. Data on participants' sociodemographic (sex, age, marital status, religion, education level, and subjective health status) and work-related characteristics (total working years, current working unit, position, workplace bullying prevention training, and experience of

workplace bullying) were obtained using a self-report questionnaire specifically developed for this study by the researchers. Validated instruments were used to assess meritocracy, emotional intelligence, organizational culture, and workplace bullying (victim and perpetrator aspects). Permission to use the Korean versions of these instruments was obtained from the original researchers and authors.

2.4.1. Meritocracy Belief. The Meritocracy Belief Scale [14] was used to measure belief in meritocratic justice. It consists of eight questions on a 6-point Likert-type scale (1 = not experienced at all and 6 = very strongly experienced), and the scores range from 8 to 48 points. In the original study, the tool's convergent, discriminant, and content validity were verified, and Cronbach's $\alpha=0.83$ [15]. In this study, Cronbach's $\alpha=0.79$.

2.4.2. Emotional Intelligence. Emotional intelligence was assessed using the Wong and Law Emotional Intelligence Scale, originally developed by Wong and Law [40] and adapted and validated in the Korean language by Jeong et al. [41]. This scale consists of 16 items in the following sub-domains: self-emotional appraisal, others' emotional appraisal, regulation of emotion, and use of emotion. Each item is rated on a 7-point Likert scale, and the total score ranges from 16 to 112 points, with higher scores indicating higher levels of emotional intelligence. The internal consistency reliability of the original scale was reported as Cronbach's $\alpha=0.76$ to 0.89 [40], whereas in the Korean version, Cronbach's $\alpha=0.88$ (0.80 to 0.89) [41]. In this study, Cronbach's $\alpha=0.90$ (0.80 to 0.88).

2.4.3. Organizational Culture. The Positive Nursing Organizational Culture Measurement Tool [42] was used to assess organizational culture. It comprises 26 items divided into the following subfactors: positive leadership of the nursing unit manager, pursuit of common values, formation of organizational relationships based on trust, and a fair management system. Each item is rated on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much so). The total score ranges from 24 to 120 points, with higher scores indicating a stronger recognition of the positive aspects of the nursing organizational culture. The internal consistency reliability of the scale in the original study was Cronbach's $\alpha=0.95$ (0.83 to 0.95) [42]. In this study, Cronbach's $\alpha=0.96$.

2.4.4. Workplace Bullying Experiences. The Korean version [43] of The Negative Acts Questionnaire-Revised (NAQ-R) [44] was used to assess workplace bullying experiences from the victim's perspective. The NAQ-R defines victims of workplace bullying as those who experienced direct and indirect aspects of work-related bullying, person-related bullying, or physical intimidation [44]. The NAQ-R consists of 22 items (i.e., being humiliated or ridiculed in connection with your work and having allegations made against you) rated on a 5-point Likert scale. The total score ranges from 22 to 110 points, with higher scores indicating

more severe workplace bullying. The internal consistency reliability of the original scale was reported as Cronbach's $\alpha = 0.93$ [44], while in the Korean version, Cronbach's $\alpha = 0.93$ [43]. In this study, Cronbach's $\alpha = 0.96$.

The Negative Acts Questionnaire-Perpetrator (NAQ-R-P) [45; currently under publication] was used to measure workplace bullying experiences from the perpetrator's perspective. The items of the NAQ-R-P were constructed by modifying items from the NAQ-R [44] that focused on victim aspects, adjusting them to situations involving perpetrators. The NAQ-R-P consists of 22 items rated on a 5-point Likert scale, with a scoring range of 22–110; higher scores indicate more severe workplace bullying instigation [44]. This scale is unidimensional, and its validity has been verified [45]. The Tucker–Lewis Index = 0.86, Incremental Fit Index = 0.90, Comparative Fit Index = 0.88, Normal Fit Index = 0.85, and Content Validity Index for the universal scale is 0.83 [45]. In the original study, Cronbach's α for the NAQ-R-P was 0.97 [45]. In this study, Cronbach's α was 0.97.

2.5. Data Analysis. The data were analyzed using IBM SPSS for Windows (version 26.0; IBM Corp., Armonk, NY, USA). Repeat participation in the survey link was strictly limited, and there were no missing values, as all questions were answered. Descriptive statistics were used to analyze the participants' sociodemographic and work-related characteristics, meritocracy, emotional intelligence, organizational culture, and workplace bullying. The normality of the variables was evaluated using the Shapiro–Wilk test. The normality assumption was not satisfied. Mann–Whitney U and Kruskal–Wallis tests were used to examine differences in workplace bullying (victim and perpetrator aspects) based on participants' sociodemographic characteristics. Spearman's rank correlation coefficient was used to assess the association among the major variables. Gamma generalized linear regression analysis was performed to determine the effects of the major variables on workplace bullying experiences (victim and perpetrator aspects).

3. Results

3.1. Participants' Sociodemographic and Work-Related Characteristics. Table 1 presents the sociodemographic and work-related characteristics of the participants. The participants' median age was 30.00 years (interquartile range: 27.00~37.00, minimum: 22.00, maximum: 55.00), and the majority were women, accounting for 352 (92.9%) participants in the total sample. Among the participants, 231 (60.9%) were unmarried, and 222 (58.6%) were non-religious. Regarding education, 280 (73.9%) participants held a bachelor's degree. In terms of occupation, 307 (81.0%) participants were registered staff nurses. The majority of participants (202, 53.3%) were currently working in general wards. The median of clinical experience was 6.00 years (interquartile range: 3.00~11.00). Furthermore, 230 (60.7%) reported completing workplace bullying prevention training in the past year; 88 (23.2%) reported experiencing workplace

bullying in the past year; 25 (6.6%) reported being workplace bullying perpetrators; and 149 (39.3%) reported witnessing their colleagues being bullied.

3.2. Differences in Victim and Perpetrator Aspects of Workplace Bullying by Sociodemographic and Work-Related Characteristics. The results of the analysis of the differences in workplace bullying (victim and perpetrator aspects) based on sociodemographic and work-related characteristics are presented in Tables 2 and 3, respectively. Table 2 shows that workplace bullying (victim aspect) was significantly higher among participants who reported their subjective health status as "not healthy," those who had experienced workplace bullying in the past year, and those who had witnessed workplace bullying in the past year. Similarly, Table 3 illustrates that workplace bullying (perpetrator aspects) was significantly higher among those who reported their subjective health status as "not healthy," those who had been victims of workplace bullying in the past year, and those who had witnessed workplace bullying in the past year.

3.3. Correlation among the Major Variables. Workplace bullying experiences (victim aspect) were positively correlated with meritocracy beliefs ($\rho = 0.13$, $p = 0.010$) and negatively correlated with emotional intelligence ($\rho = -0.10$, $p = 0.046$) and organizational culture ($\rho = -0.30$, $p < 0.001$). Workplace bullying experiences (perpetrator aspect) were positively correlated with meritocracy beliefs ($\rho = 0.16$, $p = 0.002$) and negatively correlated with emotional intelligence ($\rho = -0.17$, $p < 0.001$) and organizational culture ($\rho = -0.19$, $p < 0.001$). A significant positive correlation was found between the victim and perpetrator aspects of workplace bullying experiences ($\rho = 0.50$, $p < 0.001$) (Table 4).

3.4. Factors Affecting Workplace Bullying Experiences (Victim and Perpetrator Aspects)

3.4.1. Victim Aspect of Workplace Bullying Experiences. The variables that were significant at $p < 0.05$ in the analysis of differences in workplace bullying (victim aspect) based on participants' characteristics, as well as the variables that were correlated with the victim aspect, were included in the Gamma generalized linear regression model. Factors influencing the victim aspect of workplace bullying were witnessing workplace bullying, meritocracy beliefs, and organizational culture (Table 5). From the perspective of victim, hypotheses 1 and 3 were supported; however, hypothesis 2 was not.

3.4.2. Perpetrator Aspect of Workplace Bullying Experiences. The variables that were significant at $p < 0.05$ in the analysis of differences in workplace bullying (perpetrator aspect) based on participants' characteristics, as well as the variables that were correlated with the perpetrator aspect, were included in the Gamma generalized linear regression model. Factors influencing the perpetrator aspect of workplace

TABLE 1: General and work-related characteristics of the participants ($N = 379$).

Characteristics	Categories	N (%)	Median (interquartile range)
Age (years)			30.00 (27.00~37.00)
Gender	Female	352 (92.9)	
	Male	27 (7.1)	
Marital status	Single	231 (60.9)	
	Married	148 (39.1)	
Religion	No	222 (58.6)	
	Yes	157 (41.4)	
Educational level	3-year college	48 (12.7)	
	Bachelor's degree	280 (73.9)	
	Master's degree or higher	51 (13.5)	
Subjective health status	Not healthy	228 (61.2)	
	Healthy	151 (39.8)	
Career length (years)			6.00 (3.00~11.00)
Current working unit	Intensive care unit	81 (21.4)	
	Ward	202 (53.3)	
	Outpatient department	46 (12.1)	
	Others [†]	50 (13.2)	
Position	Staff nurse	307 (81.0)	
	Charge nurse or above	72 (19.0)	
Workplace bullying prevention training [‡]	No	149 (39.3)	
	Yes	230 (60.7)	
Experience of workplace bullying as victims [‡]	No	291 (76.8)	
	Yes	88 (23.2)	
Experience of workplace bullying as perpetrators [‡]	No	354 (93.4)	
	Yes	25 (6.6)	
Witnessed their colleagues being bullied [‡]	No	230 (60.7)	
	Yes	149 (39.3)	

Notes. [†]Emergency department, operating room, and clinical specialist, and [‡]within one year.

TABLE 2: Comparison of differences in workplace bullying (victim aspect) by general and work-related characteristics ($N = 379$).

Characteristics	Categories	N	Workplace bullying (victim aspect)		
			Mean rank	U or H	p
Gender	Female	352	188.52	0.95	0.342
	Male	27	209.31		
Marital status	Single	231	194.82	1.07	0.284
	Married	148	182.48		
Religion	No	222	192.17	0.46	0.647
	Yes	157	186.94		
Education level	3-year college	48	202.57	0.84	0.659
	Bachelor's degree	280	189.03		
	Master's degree or higher	51	183.49		
Subjective health status	Not healthy	228	205.54	3.39	<0.001
	Healthy	151	166.53		
Current working unit	Intensive care unit	81	191.56	5.25	0.155
	Ward	202	198.55		
	Outpatient department	46	158.92		
	Others [†]	50	181.54		
Position	Staff nurse	307	190.81	3.06	0.765
	Charge nurse or above	72	186.53		
Workplace bullying prevention training [‡]	No	149	184.05	0.85	0.395
	Yes	230	193.85		
Experience of workplace bullying as perpetrators [‡]	No	354	186.90	2.08	0.038
	Yes	25	233.96		
Witnessed their colleagues being bullied [‡]	No	230	155.86	7.54	<0.001
	Yes	149	242.70		

Notes. Others[†]: emergency department, operating room, and clinical specialist, and [‡]within one year.

TABLE 3: Comparison of differences in workplace bullying (perpetrator aspect) by general and work-related characteristics ($N = 379$).

Characteristics	Categories	N	Workplace bullying (perpetrator aspect)		
			Mean rank	<i>U</i> or <i>H</i>	<i>p</i>
Gender	Female	352	187.04	1.91	0.057
	Male	27	228.65		
Marital status	Single	231	193.10	0.69	0.491
	Married	148	185.17		
Religion	No	222	187.21	0.59	0.555
	Yes	157	193.95		
Education level	3-year college	48	187.42	0.47	0.792
	Bachelor's degree	280	192.07		
	Master's degree or higher	51	181.08		
Subjective health status	Not healthy	228	205.00	3.28	0.001
	Healthy	151	167.35		
Current working unit	Intensive care unit	81	183.87	7.14	0.068
	Ward	202	199.56		
	Outpatient department	46	153.14		
	Others [†]	50	195.23		
Position	Staff nurse	307	193.34	1.67	0.220
	Charge nurse or above	72	175.78		
Workplace bullying prevention training [‡]	No	149	197.58	1.09	0.278
	Yes	230	185.09		
Experience of workplace bullying as victims [‡]	No	291	175.55	4.68	<0.001
	Yes	88	237.78		
Witnessed their colleagues being bullied [‡]	No	230	170.54	4.30	<0.001
	Yes	149	220.04		

Notes. Others[†]: emergency department, operating room, and clinical specialist, and [‡]within one year.

bullying were workplace bullying experiences, meritocracy beliefs, and emotional intelligence (Table 6). From the perspective of perpetrator, hypotheses 1 and 2 were supported; however, hypothesis 3 was not.

4. Discussion

This study aimed to investigate the factors influencing workplace bullying experiences from both victims' and perpetrators' perspectives, focusing specifically on meritocracy beliefs, emotional intelligence, and organizational culture. There has been sustained interest in developing and implementing various intervention programs and solutions aimed at preventing workplace bullying, which persists as a significant issue within organizational culture [5, 32, 33]. Nevertheless, this study shows that efforts to eradicate workplace bullying have not bridged the gap in the perception of victims and perpetrators, indicating a significant lack of awareness among perpetrators. Moreover, as the number of witnesses to workplace bullying exceeds the number of victims, those who experience workplace bullying often perceive it as a by-product of organizational culture rather than fully recognizing the seriousness of the harm they have suffered [30, 31]. Previous research has highlighted the critical role of nursing organizational culture in influencing workplace bullying, emphasizing the necessity of implementing specific strategies and organizational-level interventions to avoid a hierarchy-oriented culture [27, 29–31]. These studies demonstrate that nurses who have

been victims of workplace bullying often find it challenging to actively address the issue, with such repetitions frequently stemming from and reinforcing the characteristics of the organizational culture [29, 30].

The findings of this study revealed that several factors influenced the victim aspect of workplace bullying. Specifically, the experience of witnessing workplace bullying, meritocracy beliefs, and organizational culture emerged as significant factors associated with the occurrence of workplace bullying as a victim. Establishing an organizational culture rather than focusing solely on individual abilities or differences is crucial. Organizational initiatives aimed at cultivating an optimal workplace environment for nurses hold significance in enhancing nursing organizational culture [28, 46]. To date, various programs have been implemented at both individual and organizational levels to reduce the incidence of workplace bullying. For individual strengthening, initiatives such as depression and stress management and psychiatric counseling have been explored. On the organizational level, efforts have included participation in conflict management training programs, policies to facilitate smooth communication, and the application of social media within the hospital environment [34, 47, 48]. Both approaches must be easily accessible to the target audience, and integrating these initiatives into the organizational culture remains a future challenge.

Younger generations place a high value on meritocracy, and their stronger meritocracy beliefs can lead to uncertain outcomes and contribute to workplace bullying toward

TABLE 4: Correlations among variables ($N = 379$).

	Career length	Meritocracy belief	Emotional intelligence	Organizational culture	Workplace bullying (victim)	Workplace bullying (perpetrator)
Career length	1					
Meritocracy belief	0.06 (0.266)	1				
Emotional intelligence	0.06 (0.234)	0.29 (<0.001)	1			
Organizational culture	-0.14 (0.008)	0.23 (<0.001)	0.48 (<0.001)	1		
Workplace bullying (victim)	-0.08 (0.105)	0.13 (0.010)	-0.10 (0.046)	-0.30 (<0.001)	1	
Workplace bullying (perpetrator)	0.00 (0.959)	0.16 (0.002)	-0.17 (<0.001)	-0.19 (0.001)	0.50 (<0.001)	1

TABLE 5: Factors affecting workplace bullying (victim aspect) ($N = 379$).

Variables	<i>B</i>	SE	Wald	<i>p</i>	95% Wald CI	
					Lower	Upper
(Constant)	4.14	0.11	1305.71	<0.001	3.91	4.26
Subjective health status [†]	-0.02	0.04	0.38	0.540	-0.10	0.05
Experience of workplace bullying perpetrators [†]	-0.02	0.07	0.08	0.778	-0.15	0.11
Witnessed their colleagues being bullied [†]	0.24	0.04	47.41	<0.001	0.17	0.31
Meritocracy belief	0.01	0.00	9.24	0.002	0.01	0.02
Emotional intelligence	0.01	0.00	0.71	0.401	-0.01	0.01
Organizational culture	-0.01	0.00	39.40	<0.001	-0.01	-0.01

$\chi^2 = 105.85$, $p < 0.001$, log likelihood = -1609.91, deviance/df = 0.11

Notes. SE, standard error; VIF, variance inflation factor; CI, confidence interval. [†]Dummy variable (reference): subjective health status (not healthy), experience of workplace bullying perpetrators (no), and witnessed their colleagues being bullied (no).

TABLE 6: Factors affecting workplace bullying (perpetrator aspect) ($N = 379$).

Variables	<i>B</i>	SE	Wald	<i>p</i>	95% Wald CI	
					Lower	Upper
(Constant)	3.89	0.12	972.97	<0.001	3.64	4.13
Gender [†]	0.13	0.07	3.32	0.069	-0.01	0.26
Subjective health status [†]	-0.01	0.04	0.01	0.947	-0.08	0.08
Experience of workplace bullying as victims	0.13	0.05	6.59	0.010	0.03	0.23
Witnessed their colleagues being bullied	0.08	0.05	2.88	0.089	-0.01	0.17
Meritocracy beliefs	0.02	0.00	41.87	<0.001	0.01	0.02
Emotional intelligence	-0.01	0.00	24.26	<0.001	-0.02	-0.01
Organizational culture	-0.01	0.00	1.73	0.189	-0.01'	0.01

$\chi^2 = 98.94$, $p < 0.001$, log likelihood = -1485.97, deviance/df = 0.12

[†]Dummy variable (reference): gender (female), subjective health status (not healthy), experience of workplace bullying victims (no), and witnessed their colleagues being bullied (no). SE, standard error; VIF, variance inflation factor; CI, confidence interval.

others [14, 15, 17]. Relying solely on quantitative evaluation without relational assessment can also contribute to workplace bullying [32]. Therefore, incorporating qualitative evaluations alongside quantitative measures is necessary for a comprehensive understanding of individuals. For this reason, peer evaluation systems have been established in hospitals to maintain an appropriate level of meritocracy [49]. In addition, it is essential to employ various strategies to promote teamwork, beginning with fostering a relationship-oriented nursing organizational culture that emphasizes mutual respect and prevents careless treatment among health professionals [17, 28, 47]. Understanding the occurrence of workplace bullying, especially among colleagues, is intricately linked to the complexities of human behavior, and employing a naturalistic approach to inquiry can provide deeper insights into this phenomenon [50]. Efforts should be made to promote the significance of processes and relationships alongside tangible outcomes through a horizontal organizational culture and transparent communication channels.

This study identified several factors that influence the perpetrator aspects of workplace bullying. These factors included experience of workplace bullying as a victim, meritocracy beliefs, and emotional intelligence. This study underscores the significance of implementing strategies aimed at enhancing emotional intelligence as essential measures to prevent and mitigate future workplace harassment. Lu and Shorey found that nurses were aware of the importance of emotional intelligence in clinical practice,

demonstrated a strong interest in improving their emotional intelligence skills, and recognized potential obstacles to the development of emotional intelligence [26]. Improving emotional intelligence not only enhances the value of patient-centered, personalized nursing care but also fosters stronger relationships among nurse colleagues. Emotional intelligence is acknowledged as a valuable asset enhancing performance and fostering effective group cohesion among nurses, serving as a universal buffer and coping strategy for work-related stress [51]. However, despite recognizing the potential for improvement through learning and training, there remains a scarcity of emotional intelligence promotion and intervention programs specifically tailored to healthcare professionals [52]. Hence, we recommend that more nursing leadership and intervention studies be conducted to ascertain the role of enhanced emotional intelligence among nurses. In particular, efforts to strengthen emotional intelligence include managers incorporating emotional intelligence competencies as a key criterion in the recruitment strategy for new nurses and university professors enhancing educational curricula to better develop these competencies [51, 52]. It is imperative for nurse managers to adeptly understand and harness emotional intelligence competencies.

Among the factors influencing workplace bullying by perpetrators, the concept of meritocracy warrants a balanced discussion due to its potential for both positive and negative effects. If achievements are the sole focus, the prevalence of meritocracy beliefs may lead to justifying both workplace

bullying victimization and perpetration [15]. Balancing meritocracy beliefs to account for both nurses' care outcomes and their impact on patients' quality of life is essential for fostering a healthy and supportive workplace environment. Additionally, based on the results of this study, which identified the experience as a victim of workplace bullying as an influencing factor for the perpetrator, it supports existing research findings that victims change into perpetrators over time [53, 54]. It is essential to make individual or organizational efforts to avoid becoming a victim of workplace bullying and establishing an organizational culture for this is important.

4.1. Limitations. In the current study, data were collected through an online survey as an open call invitation and institutions could not be determined; therefore, it may have led to self-selection bias and institutional effects cannot be identified. In addition, organizational factors such as nurse staffing or other work environments were not investigated. In future research, employing a random multistage sampling is recommended, and institutional characteristic effects should be assessed through multilevel analysis. To understand the situation of the nursing field, the status of meritocracy beliefs, emotional intelligence, organizational culture, and workplace bullying experiences among the various clinical settings should be compared. Additionally, the use of only self-reported measures suggests the need to include objective indicators, such as observations of workplace bullying behavior, for a more comprehensive analysis. Furthermore, to increase the explanatory power of the influencing factors of victims and perpetrators, we must pay attention to relationships through mixed studies. Future research should explore the relationship between emotional intelligence, meritocratic beliefs, and organizational culture. Despite these limitations, this study provides valuable insights into the factors influencing workplace bullying among clinical nurses by examining the perspectives of both victims and perpetrators.

5. Conclusions

In nursing management, customized approaches are crucial for addressing the factors contributing to workplace bullying and mitigating its negative consequences. The findings highlight the importance of targeted interventions, such as evaluating the impact of meritocracy beliefs, fostering self-reflection on potential meritocratic hubris, and enhancing nurses' emotional intelligence. Establishing an organizational culture that prioritizes relationships, trust, and open communication rather than solely emphasizing individual abilities or differences is paramount. To prevent workplace bullying among nurses, the implementation of protocols to prevent disruptive behaviors and foster teamwork is essential. These initiatives are critical in effectively combating workplace bullying and creating healthier and more supportive work environments for nurses.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

All authors have made significant contributions to the work described, sufficient to warrant listing within the authorship list, and have been involved in the drafting and development of this final manuscript.

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Research Article

Frontline Nurses' Job Satisfaction and Missed Nursing Care in a COVID-19 Dedicated Hospital in China: A Cross-Sectional Study

Xia Zhang ^{1,2} Jing Zhou,^{2,3} Fang Chen,¹ Jing Yang,¹ Zhixia Jiang,⁴
and David Hali De Jesus ²

¹Department of Critical Care Medicine, Department of Nursing, Affiliated Hospital of Zunyi Medical University, Zunyi, China

²School of Nursing, Philippine Women's University, Manila, Philippines

³Department of Nursing, The Second Affiliated Hospital of Zunyi Medical University, Zunyi, China

⁴Guizhou Nursing Vocational College, Guiyang, China

Correspondence should be addressed to Xia Zhang; zhangxia1830@126.com and David Hali De Jesus; dhdejesus@pwu.edu.ph

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This study examined the current situation and relationship between missed nursing care (MNC) and job satisfaction among frontline nurses in a hospital dedicated to treating COVID-19 patients in China. Many dedicated hospitals were constructed or refurbished to centrally manage patients with COVID-19. Most nurses and doctors in these hospitals were redeployed from other departments or hospitals. This may have compromised nursing quality and job satisfaction. The omission of nursing care is a critical factor in assessing nursing quality; therefore, focusing on both MNC and job satisfaction is essential. This cross-sectional study used convenience and snowball sampling techniques to recruit frontline nurses working in a hospital for treating COVID-19 patients from November to December 2022. The questionnaires used in this study included sociodemographic information, job satisfaction, and the MISSCARE survey. Differences in job satisfaction and MISSCARE scores among participants' demographic deviations were explored using the Mann-Whitney Z test (two groups) and the Kruskal-Wallis H test (three or more groups). The correlation between participants' job satisfaction and missed nursing actions was analysed using Spearman's correlation analysis. The analysis included 306 frontline nurses. Frontline nurses' job satisfaction was high, and their MNC was low. The highest MNC was "offer rehabilitation care and guidance to patients in need every day." The most reported reasons for the MNC were "urgent patient situations." In addition, the job satisfaction scale, MNC scores, and reasons for MNC scores showed statistically significant differences among participants' demographic variables. Moreover, this study identified a negative correlation between frontline nurses' job satisfaction and MNC. Frontline nurses' job satisfaction was high, and their MNC was low. Frontline nurses' demographics were shown to affect their job satisfaction, MNC, and reported reasons. Furthermore, participants' job satisfaction can influence the MNC. Tailored interventions aimed at maintaining low levels of MNC should consider frontline nurses' demographic characteristics and job satisfaction.

1. Introduction

Missed nursing care (MNC) refers to any aspect of required care that is omitted, either in part or in whole, or delayed [1]. Evidence has shown that missed nursing activities can negatively affect patient safety, nursing care quality, and nurses' job satisfaction [2, 3]. Prior studies indicate that the COVID-19 pandemic has challenged nurses' working patterns because of the additional workload and psychological challenges [4, 5]. The challenges associated with COVID-19

in traditional working patterns reduce nurses' efficiency and well-being and threaten nursing quality, patients' safety, and nurses' job satisfaction [6, 7]. Thus, it is pivotal to consider the MNC and job satisfaction for frontline nurses caring for patients with COVID-19.

Several scholars have investigated this issue. A systematic review of five studies revealed higher MNC incidents among COVID-19 patients during the initial wave, which reduced in the second wave compared to incidents involving non-COVID-19 patients; these studies had contrasting findings,

with some supporting and others contrasting the findings related to COVID-19 patients [8]. Two studies conducted in Sweden [9, 10] found that most nurses perceived the pandemic as having had a significant impact on the critical care workforce but less influence on MNC. A survey conducted in the Philippines [11] reported similar results, with MNC occurring at low levels. In Iran [12], Hosseini et al. (2022) reported that supportive and necessary care, such as “emotional support to the patient and/or family” and “feeding the patient when the food is still warm,” were missed more than any other form of care during the pandemic.

As mentioned previously, missed nursing activities can influence nurses’ job satisfaction. Evidence suggests that the adequacy of personal protective equipment, nurse staffing levels, and patient safety culture can predict nurses’ satisfaction during COVID-19 [11, 13]. Lavoie-Tremblay et al. (2022) found that nurses caring for COVID-19 patients experienced high chronic fatigue, poor quality of care, lower work satisfaction, and a higher intention to leave their organisation [14]. By contrast, Giménez-Espert et al. (2020) found that frontline nurses’ satisfaction level was high [15].

These diverse results indicate that medical systems and policies vary among countries. For example, China suggested that COVID-19 patients should be collectively treated to contain the spread of the virus efficiently [16]. Consequently, many dedicated hospitals were promptly built or rebuilt [17]. As most dedicated hospitals did not have workers, healthcare workers from other hospitals or provinces were deployed [18]. To prevent these workers from becoming potential sources of infection, they were required to remain on-site until new workers arrived or until they completed their treatment duty [19]. Furthermore, they had to test negative for the disease at the end of the quarantine period before returning home. Unfamiliar work environments, dynamically changing personnel, exposure to the disease, a lack of experience in their new positions, and isolation from family members may have posed significant challenges to their work quality [11, 20]. Owing to these different national conditions, few studies have examined frontline nurses’ job satisfaction and MNC in hospitals dedicated to COVID-19 in China. Researchers have postulated that there may be differences between China and other countries.

This study aimed to analyse the status and relationship between job satisfaction and MNC among frontline nurses in a hospital dedicated to COVID-19 in China. The findings of this study provide valuable insights for nursing managers and policymakers in the future.

2. Materials and Methods

2.1. Study Design and Settings. This cross-sectional study was conducted anonymously in a hospital dedicated to COVID-19 patients in China from November to December 2022, using convenience and snowball sampling techniques. This study was approved by the institutional review board.

2.2. Participants. All nurses deployed to Jiangjunshan Hospital in Guizhou Province to care for COVID-19 patients were eligible for this anonymous cross-sectional study. The inclusion criteria were that the nurses should have worked in the hospital for at least one month, should have provided nursing care directly to COVID-19 patients, could read and fill out a questionnaire, and had volunteered to participate. The exclusion criteria included not completing the questionnaire on time or taking less than 180 seconds (a pilot test in which 30 participants completed the questionnaire showed that reading and completing the questionnaire carefully took a minimum of 180 seconds).

The sample size was calculated using a method introduced by Wang and Ji (2020) and MNC proportions during the COVID-19 pandemic by Falk et al. (2022) [9, 21], considering a 15% invalid questionnaire rate. Therefore, the final sample size was determined as 284.

2.3. Measures

2.3.1. Participants’ Demographic Profiles. The researchers created the demographic profiles questionnaire (including gender, age, educational background, marital status, number of children, family support, friends support, professional titles, original hospital level, original hospital type, working departments in their original hospital and the dedicated hospital, position in their hospital, serving years, working days in the dedicated hospital, working hours per shift and week in the dedicated hospital, and time spent working in the dedicated hospital).

2.3.2. Participants’ Job Satisfaction. Frontline nurses’ job satisfaction was measured using the Chinese version of the job satisfaction scale translated by Kachie Tetgoum (2021) [22] and developed by Paek et al. (2015) [23]. The scale comprised five items. Each item is answered on a 7-point Likert scale ranging from 1 (extremely dissatisfied) to 7 (extremely satisfied). To present the results better, the researchers divided the job satisfaction results into three levels: low (5–15), medium (16–25), and high (26–35), based on the total score of the questionnaire.

2.3.3. Participants’ MISSCARE Survey. The third section analysed the MNC and the reasons, using a Chinese version of the MISSCARE Survey from Si (2019) [24]; the original was created by Kalisch and Williams (2009) [1]. The survey had two parts: Part A (nursing care actions) included 24 items, and Part B (reasons for missed care) contained 19 items. The MNC items were answered on a 5-point Likert scale ranging from “always missed” to “never missed.” Another 19 items on the reasons for MNC were based on a 4-point Likert scale ranging from “significant reason” to “not a reason for MNC.”

To better present the results, the researchers divided the MNC results into three levels—low (24~56), medium (57~88), and high (89~120)—based on the total score in

section A. To treat all variables dichotomously, the researchers defined MNC in section A as reported “occasionally,” “frequently,” or “always,” similar to the MNC in the study by Falk et al. (2022) [9]. Furthermore, the researchers deemed the rate for each item of the MNC as high-incidence when its percentage was more significant than 50%, whereas those equal to or lower than 50% were low-incidence MNC.

The researchers also divided the reasons for the MNC survey into three levels—low (19~37), medium (38~57), and high (58~76)—based on the total score in section B. In addition, the researchers adopted the method used in Falk et al. [9] to regard “significant” and “moderate” reasons as considered reasons for MNC. Furthermore, this study also deemed each item’s occurrence rate as a high-incidence reason when its percentage was more significant than 50% and as a low-incidence reason when its ratio was equal to, or lower than, 50%.

2.3.4. Reliability and Validity. According to the study by Kachie Tetgoum (2021) [22], the reliability of the Chinese version’s Job satisfaction scale (Cronbach’s alpha, α) was 0.88, indicating that this scale is a reliable tool for assessing nurses’ job satisfaction.

Based on Si’s (2019) results [24], the Chinese version of MISSCARE Survey’s content validity index (CVI) for MNC and its reasons were 0.98 and 0.94, respectively, and their internal reliability (Cronbach’s alpha, α) were 0.93 and 0.92, respectively, indicating that it is a reliable tool for assessing MNC.

Owing to the different participants in this and other studies, a pilot survey with 30 participants was conducted to test the reliability of the scales in this study. The participants’ inclusion and exclusion criteria were the same as those of the survey participants mentioned above. The test results showed that the Job satisfaction scale’s reliability (Cronbach’s alpha, α) was 0.951 and the validity (Kaiser–Meyer–Olkin, KMO index) was 0.83. For the MNC questionnaire, the reliability (Cronbach’s alpha, α) was 0.998 and its validity (KMO) was 0.835. Regarding the reasons for MNC questionnaire, the reliability and validity were 0.987 and 0.774, respectively, indicating that the questionnaires used in this study were reliable tools for this study.

2.3.5. Data Collection. The data were collected between November and December 2022. The nursing staff in the research location was in workgroups on social media (WeChat) when they were deployed to the dedicated hospital. These workgroups have not yet been dissolved. First, the researchers posted a letter to the workgroups introducing the survey’s aim, content, and instructions. Furthermore, the researchers emphasised that each nurse would participate in the study voluntarily and anonymously. Second, the final questionnaires were imported into a survey website (<https://www.wjx.cn/>), and the questionnaire link was shared with frontline nurses in the workgroups. Third, when respondents clicked on the link, they could see two options: “willing to participate” and “unwilling to participate.” Only participants who selected “willing to participate” could open the complete

questionnaire. Thereafter, they could see an opening to the questionnaire introducing the aim, content, and instructions, and they participated in the survey through their accounts. In addition to frontline nurses who had left the workgroup, researchers contacted familiar frontline nurses who have worked at Jiangjunshan Hospital to recruit more nurses using a snowball sampling technique.

2.3.6. Data Analysis. Software SPSS v22.0 (IBM Inc., Armonk, NY, USA) was used to analyse the data. Data were presented as frequencies, percentages, means (standard deviation, SD), and medians (IQRs). Skewness, kurtosis, and Q-Q plots were used to test data distribution. Considering the abnormal distribution of data in this study, differences in job satisfaction and MISSCARE scores among participants’ demographic deviations were explored using the Mann–Whitney Z test (two groups) and Kruskal–Wallis H test (three or more groups). The correlation between participants’ job satisfaction and missed nursing actions was analysed using Spearman’s correlation analysis. For all analyses, $p < 0.05$ were considered statistically significant.

3. Results

3.1. Participants’ Demographic Profiles. In total, 310 frontline nurses responded to the survey; however, six nurses took a short time to complete the questionnaire (less than 180 s). Therefore, 304 nurses were included in the statistical analysis. The results showed that 77.63% (236/304) of the participants were female. Nurses aged 31–40 years accounted for 56.58% (172/304), 90.13% (274/304) had a bachelor’s degree, 79.93% (243/304) were married, and 44.08% (134/304) had only one child. The detailed demographic information is presented in Table 1.

3.2. Participants’ Job Satisfaction. The results showed that most participants choose “often” or “always” as their answer for each item, and each item’s median (IQR) score was from 6 (1) to 7 (1). Participants’ total median (IQR) score of their job satisfaction in the dedicated hospital was 32 (5.75), a high-level score (i.e., 26~35), indicating that the participants’ satisfaction with each item was high. The details are listed in Table 2.

3.3. Participants’ Missed Nursing Action. The results from this study demonstrated that the percentage of MNC items varied from 17.43% (53/304) to 27.96% (85/304), indicating that each MNC provided low-incidence care (i.e., lower than 50%). In addition, item 1 had the highest score, and its median (IQR) was 2 (2); other items scored a median (IQR) of 1 (1); and the total median (IQR) score of the questionnaire was 32 (22), a low-level score (i.e., 24–56). The three significant missed nursing activities in this study were “offer rehabilitation care and guidance to patients in need every day,” “emotional support for patient and/or family,” and “patient teaching about illness, tests, and diagnostic studies.” Additional information is presented in Table 3.

TABLE 1: Participants' demographic characteristics.

Variables (N = 304)	Categories	Frequency	Percentage
Gender	Male	68	22.37
	Female	236	77.63
Age median (IQR)	32 (6)		
Age (year)	23~30	107	35.20
	31~40	172	56.58
	41~53	25	8.22
Educational level	Junior college or below	25	8.22
	Bachelor's degree	274	90.13
	Master's degree or above	5	1.64
Marital status	Single	56	18.42
	Married	243	79.93
	Others	5	1.64
Children number	0	78	25.66
	1	134	44.08
	2	90	29.61
	3	2	0.66
Family support	Adequate	253	83.22
	Inadequate	51	16.78
Friend support	Adequate	252	82.89
	Inadequate	52	17.11
Professional title	Junior	172	56.58
	Intermediate	114	37.50
	Senior	18	5.92
Original hospital level	Tertiary	259	85.20
	Secondary	44	14.47
	Others	1	0.33
Original hospital type	Comprehensive hospital	283	93.09
	Specialized hospital	21	6.91
Original department	Intensive care unit	145	47.70
	Emergency department	88	28.95
	Outpatient department	3	0.99
	Surgery department	27	0.88
	Medicine department	25	8.22
	Others	16	5.26
Original post	Clinical nurse	235	77.30
	Head nurse	34	11.18
	Others	35	11.51
<i>Years of service median (IQR) 10 (5)</i>			
Years of service (year)	3~10	173	56.91
	11~20	110	36.18
	21~30	21	6.91
Time of working in the dedicated hospital	2020	42	13.82
	2021	111	36.51
	2022	99	32.57
	Others (consecutive two or three years)	52	17.11
	<i>Days of working in the dedicated hospital median (IQR)</i>		
Days of working in the dedicated hospital	30~60	207	68.09
	61 or above	97	31.91
Working department in the dedicated hospital	Intensive care unit	174	57.24
	Isolation ward	113	37.17
	Other departments	17	5.59
<i>Working hours per shift in the dedicated hospital median (IQR)</i>			
Working hours per shift in the dedicated hospital (hours)	4~6	262	86.18
	7~8	31	10.20
	8.5 or above	11	3.62
<i>Working hours per week in the dedicated hospital median (IQR)</i>			36 (14)

TABLE 1: Continued.

Variables (N = 304)	Categories	Frequency	Percentage
Working hours per week in the dedicated hospital (hours)	21~30	123	40.46
	31~40	78	25.66
	41 or above	103	33.88

3.4. Participants' Reasons for Missed Nursing Care. This study found that the rate of each reason for missed care ranged from 18.09% (55/304) to 55.26% (168/304) and the median (IQR) for each item ranged from 1 (1) to 3 (2), with a total median (IQR) score of 37 (19), indicating that these were low-level reasons. However, the percentages of "urgent patient situations," "unexpected rise in patient volume and/or acuity on the unit," and "the nurse did no nursing work" items were greater than 50%, indicating that these three were high-incidence reasons for the MNC in this study. Other details are listed in Table 4.

3.5. Comparison between Job Satisfaction and the MISSCARE Scores among Participants' Demographic Characteristics. There were significant differences in frontline nurses' total job satisfaction scores by age ($p = 0.001$), marital status ($p = 0.022$), number of children ($p = 0.006$), professional title ($p = 0.021$), and original department ($p = 0.002$). Higher job satisfaction was identified among frontline nurses who were older, married, had children, and higher professional titles, and were not originally from the ICU or emergency departments.

Regarding the MNC scores, significant statistical differences ($p < 0.05$) were observed among participants of different ages, family support, friend support, hospital types, and original department. Nurses with sufficient social support and older nurses reported fewer MNC. Nurses from the emergency department scored higher MNC points than those from other departments.

In addition, the study found significant differences ($p < 0.05$) in the reported reasons scores among frontline nurses based on various demographic and work-related factors. These factors include gender, age, family support, friend support, original hospital type, original department, time spent working in the dedicated hospital, working department in the dedicated hospital, and working hours per shift in the dedicated hospital. Frontline nurses who were male, younger, lacked support from family and friends, worked in comprehensive hospitals, originally worked in the ICU and emergency departments, worked in the dedicated hospital's ICU, and worked four to six hours per shift reported higher reasons scores. Detailed information is provided in Table 5.

3.6. The Correlations (Spearman) between the Respondents' Job Satisfaction and Their Missed Nursing Care Scores. The researchers used the total score of the MISSCARE A questionnaire as the dependent variable and the total score of the job satisfaction questionnaire, as well as each item's score of the job satisfaction questionnaire, as independent variables. Spearman's test was used to analyse the correlation

because the data had an abnormal distribution. The results revealed a negative correlation between participants' job satisfaction and missed care action scores. In addition, each item in the job satisfaction questionnaire was negatively correlated with missed nursing actions (Table 6). These findings suggest that frontline nurses with higher job satisfaction tend to miss fewer nursing care actions.

4. Discussion

Both the quality of nursing care and nurses' job satisfaction has been crucial issues in healthcare systems. MNC is an essential quality indicator in clinical practice that can influence nurses' job satisfaction. Therefore, this study analysed the current situation of MNC and job satisfaction among frontline nurses in a dedicated hospital in China. Based on the results, frontline nurses' job satisfaction was high while their MNC was low. Job satisfaction among participants can still influence MNC, ultimately affecting the quality of nursing care provided.

4.1. Frontline Nurses' Job Satisfaction. This study's results showed that frontline nurses in the dedicated hospital had high job satisfaction levels. These findings suggest that frontline nurses were satisfied with their work environment in the dedicated hospital. However, these results differ from those of other studies exploring frontline nurses' job satisfaction during the COVID-19 crisis. Wang et al. (2022) reported that frontline nurses in Wuhan experienced moderate levels of compassion satisfaction during the first wave of the pandemic in Wuhan [25]. By contrast, our study was conducted at the end of 2022, the third year of the pandemic, when healthcare workers had gained more experience and skills and could adequately prepare for and cope with the pandemic. Giménez-Espert et al. (2020) found that frontline nurses' satisfaction was high [15], whereas Falk et al. (2022) reported that nurses' job satisfaction improved as the pandemic progressed [9]. Frontline nurses' job satisfaction was higher in the second wave than in the first. This study confirms the reasons for the differences between the two studies.

4.2. Frontline Nurses' Missed Nursing Care. This study's results demonstrate that the frontline nurses' MNC was low. Von Vogelsang et al. (2021) reported the presence of MNC during the COVID-19 pandemic [10]. However, their results showed a higher percentage of MNC compared to that shown in this study, such as the two items' occurrence percentages being more significant than 50% in their research. By contrast, the highest incidence rate in this study was only 27.96%. A study in Iran by Hosseini et al. (2022)

TABLE 3: Results of participants' missed nursing action (in descending order of each missed nursing action's percentage).

Items	Never/1 point		Rarely/2 points		Occasionally/3 points		Frequently/4 points		Always/5 points		Missed care	
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	Yes N (%)	Rank
(1) Offer rehabilitation care and guidance to patients in need every day	139 (45.72)	80 (26.32)	38 (12.50)	15 (4.93)	32 (10.53)	2 (2)	85 (27.96)	1				
(10) Emotional support for patient and/or family	150 (49.34)	85 (27.96)	24 (7.89)	15 (4.93)	30 (9.87)	1 (1)	69 (22.69)	2				
(9) Patient teaching about illness, tests, and diagnostic studies	161 (52.96)	75 (24.67)	21 (6.91)	12 (3.95)	35 (11.51)	1 (1)	68 (22.37)	3				
(3) Assess the patient's risk in time to offer foreseeable nursing	167 (54.93)	70 (23.03)	16 (5.26)	19 (6.25)	32 (10.53)	1 (1)	67 (22.04)	4				
(14) Patient discharge planning and teaching	171 (56.25)	66 (21.71)	18 (5.92)	13 (4.28)	36 (11.84)	1 (1)	67 (22.04)	5				
(4) Assist patient with dining and dietary education	173 (56.91)	64 (21.05)	17 (5.59)	22 (7.24)	28 (9.21)	1 (1)	67 (22.04)	6				
(11) Patient bathing/skin care	184 (60.53)	54 (17.76)	14 (4.61)	15 (4.93)	37 (12.17)	1 (1)	66 (21.71)	7				
(22) Know patient's condition well by checking their medical records	171 (56.25)	68 (22.37)	14 (4.61)	17 (5.59)	34 (11.18)	1 (1)	65 (21.38)	8				
(2) Turning patient every 2 hours	174 (57.24)	66 (21.71)	19 (6.25)	15 (4.93)	30 (9.87)	1 (1)	64 (21.05)	9				
(17) Focused reassessments according to patient condition	184 (60.53)	56 (18.42)	12 (3.95)	13 (4.28)	39 (12.83)	1 (1)	64 (21.05)	10				
(21) Assess the effectiveness of medications	184 (60.53)	58 (19.08)	11 (3.62)	12 (3.95)	39 (12.83)	1 (1)	62 (20.39)	11				
(19) Response to call light is initiated within 5 min	203 (66.78)	39 (12.83)	12 (3.95)	13 (4.28)	37 (12.17)	1 (1)	62 (20.39)	12				
(8) Full documentation of all necessary data	192 (63.16)	50 (16.45)	12 (3.95)	13 (4.28)	37 (12.17)	1 (1)	62 (20.39)	13				
(5) Medications administered within 30 minutes before or after scheduled time	190 (62.50)	53 (17.43)	11 (3.62)	12 (3.95)	38 (12.50)	1 (1)	61 (20.07)	14				
(12) Mouth care	207 (68.09)	36 (11.84)	9 (2.96)	13 (4.28)	39 (12.83)	1 (1)	61 (20.07)	15				
(24) Skin/wound care	193 (63.49)	51 (16.78)	9 (2.96)	13 (4.28)	38 (12.50)	1 (1)	60 (19.74)	16				
(20) PRN medication requests acted on within 15 minutes	198 (65.13)	47 (15.46)	5 (1.64)	18 (5.92)	36 (11.84)	1 (1)	59 (19.41)	17				
(23) Assist with toileting needs within 5 minutes of request	186 (61.18)	60 (19.74)	9 (2.96)	12 (3.95)	37 (12.17)	1 (1)	58 (19.08)	18				
(13) Hand washing	213 (70.07)	33 (10.86)	5 (1.64)	11 (3.62)	42 (13.82)	1 (1)	58 (19.08)	19				
(16) Make the rounds of the wards based on patient's grading nursing care standard each shift	219 (72.04)	28 (9.21)	5 (1.64)	7 (2.30)	45 (14.80)	1 (1)	57 (18.75)	20				

TABLE 3: Continued.

Items	Never/1 point		Rarely/2 points		Occasionally/3 points		Frequently/4 points		Always/5 points		Missed care	
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	Yes N (%)	Rank
(18) IV/central line site care and assessments according to hospital policy	204 (67.11)	44 (14.47)	5 (1.64)	13 (4.28)	38 (12.50)	1 (1)	56 (18.42)	21				
(15) Bedside glucose monitoring as ordered	225 (74.01)	24 (7.89)	4 (1.32)	6 (1.97)	45 (14.80)	1 (1)	55 (18.09)	22				
(7) Monitoring intake/output	234 (76.97)	15 (4.93)	7 (2.30)	6 (1.97)	42 (13.82)	1 (1)	55 (18.09)	23				
(6) Vital signs assessed as ordered	225 (74.01)	26 (8.55)	4 (1.32)	8 (2.63)	41 (13.49)	1 (1)	53 (17.43)	24				
Total							32 (22)					

TABLE 4: Participants' reasons for missed nursing care (in descending order of each missed nursing care's percentage).

Items	Not a reason/1 point N (%)	Minor reason/2 points N (%)	Moderate reason/3 points N (%)	Significant reason/4 points N (%)	Scores median (IQR)	Reasons for MNC Yes N (%) Rank
(2) Urgent patient situations (e.g. worsening of a patient's condition)	50 (16.45)	86 (28.29)	76 (25.00)	92 (30.26)	3 (2)	168 (55.26) 1
(3) Unexpected rise in patient volume and/or acuity on the unit	60 (19.74)	80 (26.32)	83 (27.30)	81 (26.64)	3 (2)	164 (53.95) 2
(4) Nurse did no nursing work	71 (23.36)	81 (26.64)	83 (27.30)	69 (22.70)	2.5 (1)	152 (50.00) 3
(1) Inadequate number of staff	80 (26.32)	77 (25.33)	82 (26.97)	65 (21.38)	2 (2)	147 (48.36) 4
(6) Medications were not available when needed	107 (35.20)	94 (30.92)	68 (22.37)	35 (11.51)	2 (2)	103 (33.88) 5
(8) Tension or communication breakdowns with patients	123 (40.46)	94 (30.92)	62 (20.39)	25 (8.22)	2 (2)	87 (28.62) 6
(5) Unbalanced patient assignments	126 (41.45)	93 (30.59)	57 (18.75)	28 (9.21)	2 (2)	85 (27.96) 7
(7) Inadequate hand-off from previous shift or sending unit	117 (38.49)	105 (34.54)	56 (18.42)	26 (8.55)	2 (2)	82 (26.97) 8
(9) Supplies/equipment not available when needed	138 (45.39)	89 (29.28)	48 (15.79)	29 (9.54)	2 (2)	77 (25.33) 9
(19) Underdeveloped management and quality assurance system	139 (45.72)	88 (28.95)	44 (14.47)	33 (10.86)	2 (2)	77 (25.33) 10
(12) Tension or communication breakdowns with other ancillary/support departments	149 (49.01)	82 (26.97)	48 (15.79)	25 (8.22)	2 (1)	73 (24.01) 11
(10) Supplies/equipment not functioning properly when needed	146 (48.03)	87 (28.62)	47 (15.46)	24 (7.89)	2 (1)	71 (23.36) 12
(16) Patient's and family's refusal	139 (45.72)	95 (31.25)	50 (16.45)	20 (6.58)	2 (1)	70 (23.03) 13
(11) Lack of backup support from team members	147 (48.36)	88 (28.95)	43 (14.14)	26 (8.55)	2 (1)	69 (22.70) 14
(18) Nurses with less job responsibility	144 (47.37)	91 (29.93)	41 (13.49)	28 (9.21)	2 (1)	69 (22.70) 15
(14) Tension or communication breakdowns within the medical staff	154 (50.66)	88 (28.95)	43 (14.14)	19 (6.25)	2 (1)	62 (20.39) 16
(17) Delayed communication between novices and nurses on patients' care	143 (47.04)	99 (32.57)	43 (14.14)	19 (6.25)	2 (1)	62 (20.39) 17
(15) Underdeveloped role description/workflow	145 (47.70)	101 (33.22)	37 (12.17)	21 (6.91)	2 (1)	58 (19.08) 18
(13) Tension or communication breakdowns within the nursing team	173 (56.91)	76 (25.00)	35 (11.51)	20 (6.58)	1 (1)	55 (18.09) 19
Total					37 (19)	

TABLE 5: Continued.

Variables (N = 304)	Categories	N (%)	Job satisfaction total scores			Missed nursing care total scores			Reasons for missed care total scores		
			Median (IQR)	Statistics	P	Median (IQR)	Statistics	P	Median (IQR)	Statistics	P
Original hospital type	Comprehensive hospital	283 (93.09)	31 (8)	-1926	0.054	31 (23)	-3.071	0.002**	37 (20)	-3.106	0.002**
	Specialized hospital	21 (6.91)	34 (5)		24 (7)			29 (15.5)			
	Intensive care unit	145 (47.70)	30 (8)		30 (29)			30 (22)			
	Emergency department	88 (28.95)	30 (7.7)		34.5 (19.8)			37.5 (15.8)			
Original department	Outpatient department	3 (0.99)	35 (3)	19.127	0.002**	24 (1)	16.357	0.006**	21 (3)	22.565	<0.001**
	Surgery department	27 (0.88)	35 (4)		24 (13)			27 (21)			
	Medicine department	25 (8.22)	33 (5)		25 (7.5)			29 (16.5)			
	Others	16 (5.26)	32 (5)		30 (73.3)			32.5 (21.7)			
Original post	Staff nurse	235 (77.30)	30 (8)	4.479	0.106	30 (22)	0.355	0.837	37 (21)	1.110	0.575
	Head nurse	34 (11.18)	34.5 (5)		30 (20.3)			34 (21.5)			
	Others	35 (11.51)	31 (7)		29 (21)			36 (22)			
Years of service (year)	3~10	173 (56.91)	30 (8)		29 (22)			37 (20)			
	11~20	110 (36.18)	33 (7)	4.329	0.115	31.5 (24)	0.931	0.628	35 (10.2)	2.381	0.304
	21~30	21 (6.91)	31 (7)		29 (14)			39 (18.5)			
	2020	42 (13.82)	34 (5)		27 (12)			27.5 (18)			
Time of working in the dedicated hospital	2021	111 (36.51)	30 (8)		31 (19)			39 (18)			
	2022	99 (32.57)	32 (8)	6.605	0.086	31 (25)	3.613	0.306	38 (20)	13.765	0.003**
	Others (consecutive two or three years)	52 (17.11)	32 (5)		32.5 (32.5)			35 (20.2)			
	30~60	207 (68.09)	30 (8)	-0.946	0.344	30 (22)	-0.466	0.641	38 (20)	-1.692	0.091
Days of working in the dedicated hospital	61 or above	97 (31.91)	32 (7)		30 (21.5)			35 (18)			
	Intensive care unit	174 (57.24)	30 (8)		31.5 (22.3)			38 (19.3)			
	Isolation ward	113 (37.17)	32 (5)	5.931	0.052	28 (19.5)	3.003	0.223	33 (18)	9.596	0.008**
	Other departments	17 (5.59)	32 (6)		34 (23)			39 (19.5)			
Working hours per shift in the dedicated hospital (hours)	4~6	262 (86.18)	30 (8)	3.601	0.165	30 (23)	2.504	0.286	38 (20)	7.379	0.025*
	7~8	31 (10.20)	34 (5)		29 (16)			30 (17)			
	8.5 or above	11 (3.62)	34 (9)		26 (14)			35 (14)			

TABLE 5: Continued.

Variables (<i>N</i> = 304)	Categories	<i>N</i> (%)	Job satisfaction total scores			Missed nursing care total scores			Reasons for missed care total scores		
			Median (IQR)	Statistics	<i>P</i>	Median (IQR)	Statistics	<i>P</i>	Median (IQR)	Statistics	<i>P</i>
Working hours per week in the dedicated hospital (hours)	21~30	123 (40.46)	30 (7)	0.059	0.971	31 (21)	1.188	0.552	37 (20)	0.916	0.633
	31~40	78 (25.66)	32 (8)	0.059	0.971	29 (30.3)	1.188	0.552	35.5 (19.2)	0.916	0.633
	41 or above	103 (33.88)	32 (7)	0.059	0.971	30 (21)	1.188	0.552	37 (192)	0.916	0.633

Note: * $p < 0.05$, ** $p < 0.01$.

TABLE 6: The correlations (Spearman) among participants' total scores and items of job satisfaction and their missed nursing cares.

Items	Missed nursing care scores	
	Coefficient	P
Total score of the job satisfaction	-0.337	<0.001**
(1) I am satisfied with my overall job	-0.294	<0.001**
(2) I am satisfied with my fellow workers	-0.280	<0.001**
(3) I am satisfied with my supervisor	-0.276	<0.001**
(4) I am satisfied with the hospital's policy	-0.314	<0.001**
(5) I am satisfied with the support provided by this hospital	-0.298	<0.001**

Note.* $p < 0.05$ ** $p < 0.01$.

[12] reported that “emotional support for patient and/or family,” “feeding patient when the food is still warm,” and “patient teaching about illness, tests, and diagnostic studies” were frequently missed items during the pandemic. Falk et al. (2022) also examined missed nursing during the first (November 2020) and second waves (May 2021) [9], finding that some items occurred more, while others occurred less, than did those in this study. In their research, the occurrence of “feeding patient when the food is still warm” and “setting up meals for the patient who feeds themselves” was 71.4% in the first wave and 79.4% in the second wave, respectively. The inconsistent results among these studies may be attributed to different survey times, places, and participants. A systematic review revealed a heightened incidence of MNC among COVID-19 patients during the initial wave and a diminished occurrence in comparison with non-COVID-19 patients in the second wave [8], which conformed to our postulation.

4.3. Frontline Nurses' Reported Reasons for Missed Nursing Care. Results from this study indicate that most reasons were low-incidence reasons, except for the “urgent patient situations” and “unexpected rise in patient volume and/or acuity on the unit” items. VonVogelsang et al. (2021) reported that the highest reasons for MNC were “unexpected rise in patient volume and/or acuity on the unit,” “urgent patient situations,” and “inadequate number of staff,” and their rates were from 32.4% to 79.8% in the first pandemic wave (May- June 2020) [10]. Falk et al. (2022) concluded that the most reported reasons for MNC in all samples were “inadequate staffing,” “urgent situations,” and “a rise in patient volume,” with rates ranging from 5.3% to 97.4% in the first wave and from 2.9% to 93.2% in the second wave [9]. Hosseini et al. (2022) reported that the significant reasons were “inadequate staff,” “urgent patient situations” (e.g., worsening of a patient's condition), and “unbalanced patient assignments.” Perhaps the different survey times, research locations, and participants could explain the inconsistent results among the three studies. For example, this survey was conducted from November to December 2022. Managers and administrators had prepared more adequately for the pandemic, and the supporting strategies and available supplies had improved. Labrague et al. (2022) found that nurse staffing levels and patient safety culture could predict MNC, confirming this study's findings [11]. In addition, the high-incidence reasons indicate that when staffing and

scheduling frontline nurses, nursing managers should adopt a flexible schedule to meet urgent clinical demands and determine frontline nurses' working scope to avoid nurses doing no nursing work.

4.4. Comparison between Job Satisfaction and MISSCARE Scores among Participants' Demographic Characteristics. First, this study's results indicated that frontline nurses who were older, married, had children, held higher professional titles, and were not originally from the ICU or emergency department showed higher job satisfaction. Generally, nurses with these characteristics receive more support from their families and original hospitals. Zhang et al. (2020) found that older healthcare workers enjoyed better mental health during the COVID-19 pandemic [26], which corroborates the findings of this study. Nurses who originally worked in the ICU or emergency department showed lower job satisfaction, possibly because of their newly allocated units and high job requirements. When staffing and scheduling nurses, nursing managers tended to allocate nurses with experience in the ICU and emergency department to the ICU, where they faced critically ill patients. González-Gil et al. (2021) suggested that critical care and emergency nurses could be categorised as vulnerable populations owing to high workloads, high patient-nurse ratios, shift work, and deficiencies in communication [27]. These reasons may explain the present study's results. Therefore, nursing managers should focus on the needs and conditions of frontline nurses and offer targeted support and assistance.

Second, this study demonstrated that older participants who lacked adequate social support scored higher on the overall missed nursing action questionnaire. One potential reason for this could be that, as nurses' age grow, their experiences and knowledge increase, which could help them deal with job demands. As mentioned previously, older healthcare workers enjoy better mental health [26]. In addition, nurses with sufficient family and friend support had lower MNC scores, which may contribute to better social support. Nurses with such backing may also be more engaged in their work, resulting in less missed care. Thus, nursing managers should consider frontline nurses' age, family and social support, and their original departments to reduce MNC.

Third, this study found that nurses from comprehensive hospitals who were originally from the emergency department and intensive care unit had higher MNC scores.

Nurses in specialised hospitals tend to have more experience in specific specialties, and when they move to a dedicated hospital, they can provide better care to patients in that area. However, nurses from comprehensive hospitals may face more choices surpassing their skill set, leading to a higher occurrence of MNC. Labrague et al. (2022) reported that hospital facility size could affect MNC [11], which is consistent with the findings of this study. Moreover, frontline nurses who worked in emergency departments and intensive care units were originally prone to being assigned to intensive care units in dedicated hospitals. Lobo et al. (2022) found that critical care nurses were disproportionately affected by the COVID-19 pandemic [28], and González-Gil et al. (2021) emphasised that critical care and emergency nurses can be categorised as vulnerable populations [27]. Thus, nursing managers should consider frontline nurses' original departments and hospital types to allocate nurses reasonably and thus maintain a low-level MNC.

Regarding the participants' serving years and gender, the results of Hosseini et al. (2022) showed that nurses with more than 10 years of work experience performed better than did those with less than 10 years of experience [12], which is consistent with the findings of this study. However, this study showed no statistically significant difference in MNC based on years of service. In addition, Hosseini et al. (2022) reported that the gender of nurses was significantly related to MNC ($p = 0.002$), with MNC being significantly lower among male nurses than among female nurses. However, this relationship was not observed in the present study.

Furthermore, Hosseini et al.'s (2022) study found that 8-hour and 12-hour rotation shifts had the highest rate of missed necessary care, whereas 7-hour shifts had the lowest rate of MNC [12]. These results are inconsistent with this study's findings, probably due to the shorter shift duration in this study, whereby most frontline nurses (86.18%) reported working for 4–6 hours per shift. In summary, nursing managers should consider frontline nurses' age, family and friend support, hospital type, and original department to reduce MNC.

Finally, the survey results indicated higher scores for male and younger frontline nurses, those with inadequate support from family and friends, those working in comprehensive hospitals or the dedicated hospitals' ICU, and those who originally worked in the ICU and emergency department and had a 4–6 hours working shift. Zhang et al. (2020) highlighted the varying levels of distress and depression experienced by the different genders [26]. In addition, a lack of social support can negatively affect nurses' emotional states, particularly those working in comprehensive hospitals, ICU, and emergency departments. Furthermore, Liu et al. (2022) found that frontline nurses in severe isolation wards worked shorter shifts of four hours compared to those in fever clinics and observation wards, who worked for 6–8 hours [29]. However, nurses who worked in 2021 and 2022 may have reported higher scores than those who worked in 2020 because of memory deviation over time. Therefore, nursing managers should prioritise frontline nurses' work conditions to enhance nursing quality.

4.5. The Correlations between the Frontline Nurses' Job Satisfaction and Their MNC. This study found a negative correlation between job satisfaction and missed care. In addition, this study also indicated that nurses miss less nursing care when they are more satisfied with their jobs, fellow workers, supervisors, hospital policy, and hospital support. A study by Gurková et al. (2022) in Czech acute care hospitals during the COVID-19 pandemic identified that overtime work, nurses' perception of the "Nursing foundations for the quality of care," and their satisfaction with their current position could predict the incidence of missed care [30]. Falk et al. (2022) determined that MNC could influence both patient outcomes and nurses' work environments [9], and that bedside nurses should develop quality indicators in critical care to address the reasons for MNC. In addition, Gurková et al. (2022) indicated that monitoring the conditions and aspects of the nurse work environment in hospitals and continuously considering nurses' concerns about the work environment on an ongoing basis are essential strategies for nurse supervision and for policymakers [30]. Labrague and de Los Santos (2021) pointed out that decreased job satisfaction could increase the fear of COVID-19 and chronic fatigue, and that resilience could reduce the effects of pandemic fatigue on clinical nurses' mental health, sleep quality, and job contentment [7]. This study confirmed the findings of the present study and indicated that hospital managers could improve nurses' job satisfaction by improving their nursing quality through their jobs, fellow workers, supervisors, hospital policies, and hospital support.

4.6. Limitations and Recommendation. The limitations of this study are as follows. First, as this study was conducted using a questionnaire survey, self-report bias is an evident limitation. Second, this study only included frontline nurses in one dedicated hospital, which may limit its generalizability to other locations. Finally, this study was conducted at the end of 2022, and frontline nurses who worked at dedicated hospitals in 2020 and 2021 may have experienced memory deviations over time. Thus, multicentre, large-sample, and more objective assessment studies are required.

Frontline nurses are an essential group that determines service quality during the response to crises relevant to emerging infectious diseases. Nursing managers should pay attention to the nurses' needs and provide tailored support and assistance based on age, gender, marital status, social support, and working environment. In addition, the results indicated that hospital managers could improve nurses' job satisfaction by improving their nursing quality through their jobs, fellow workers, supervisors, hospital policies, and hospital support.

5. Conclusion

Frontline nurses' demographics can affect their job satisfaction, MNC, and reported reasons. As the pandemic progressed, frontline nurses reported improvements in job satisfaction and a reduction in the number of MNCs. However, it should be noted that job satisfaction among participants could still influence MNC, ultimately affecting the quality of nursing care provided.

6. Implications for Nursing Management

The COVID-19 pandemic is highly contagious and poses challenges to nurses' work efficiency and emotional health. To reduce the occurrence of MNC and enhance nursing quality, hospital administrators and nursing managers should focus on improving nurses' job satisfaction by improving their work environments, supporting their relationships with colleagues and supervisors, implementing effective hospital policies, and providing adequate hospital support. Policy-makers and nursing managers should thoroughly assess the factors influencing MNC, such as nurses' characteristics. To some extent, it is possible to maintain a low level of MNC under similar conditions in the future once policymakers and nursing managers use this information to make reasonable and feasible decisions or policies.

Data Availability

The data that support the findings of this study are available from the corresponding authors and the first author upon reasonable request.

Ethical Approval

This study was approved by the Ethics Committee of the Affiliated Hospital of Zunyi Medical University (KLL-2020-283, approval date: 30 December 2020) and the Ethics Review Board of Philippine Women's University (ERB2022_0092, approval date: 17 November 2022) based on the principles of the Declaration of Helsinki. All eligible frontline nurses were informed of the study and its ethical principles (e.g., voluntary participation, withdrawal, anonymity, and confidentiality). All data were saved in password-protected computers, and nobody, except the research team, had access to the data.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Xia Zhang and David contributed to the study conception and design. Jing Zhou, Fang Chen, and Zhixia Jiang contributed to data acquisition. Xia Zhang and Jing Yang analysed and interpreted the data. Xia Zhang, Jing Zhou, and David drafted and refined the manuscript. All the authors critically revised the manuscript for important intellectual content. All authors agree to be accountable for all aspects of the work and have approved the final version for publication.

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Review Article

Global Prevalence of Nurse Turnover Rates: A Meta-Analysis of 21 Studies from 14 Countries

Hui Ren , Pan Li , Yingchun Xue , Wenhao Xin , Xin Yin , and Hongyan Li 

The First Hospital of Jilin University, Changchun, Jilin, China

Correspondence should be addressed to Hongyan Li; hy_li@jlu.edu.cn

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Background. Nurses represent the largest occupational group within the health care system, comprising half of the global health workforce. Health care settings are facing severe shortages in countries worldwide, with nurse turnover being identified as the primary reason for this shortage. However, estimates of nurse turnover rates vary widely in the relevant literature. **Objective.** This meta-analysis aimed to investigate the global nurse turnover rate since 2000 and provide evidence-based assistance to health policy makers and hospital managers. **Methods.** A systematic search of the PubMed, Web of Science, Embase, CINAHL, and Cochrane Library databases was conducted for relevant articles from January 1, 2000, to February 1, 2023. This study included cross-sectional, cohort, and longitudinal studies. In the meta-analysis, further risk of bias, heterogeneity, and subgroup analyses were conducted. Stata 17.0 was used for all of the statistical analyses. **Results.** In total, 48,157 records were scrutinized in this study, and 21 investigations encompassing 213,314 nurses across 14 countries were eventually included. The global nurse turnover rate ranged between 8% and 36.6%, and the combined nurse turnover rate was 16% (95% confidence interval: 14%–17%). Subgroup analysis demonstrated that the turnover rate was 19% (95% CI: 14%–23%) in Asia and 15% (95% CI: 13%–17%) in North America. **Conclusions.** This meta-analysis analysed the literature published from January 2020 to February 2023 and demonstrated that the global nurse turnover rate was 16%. It is suggested that all medical and health institutions actively adopt relevant systems that can reduce the turnover of nurses and promote a more harmonious, healthy, and safe occupational environment for nurses to strengthen the sustainable development capacity of the nurse workforce.

1. Introduction

Currently, the global ageing population and the increasing burden of chronic diseases (2020) are putting considerable pressure on the health care system [1]. As the largest occupational group in the health care system, nurses play a key role in the provision of health services [2]. Currently, there are an estimated 200,000 nurses and 20,000 midwives worldwide, thus representing approximately half of the global human resources in the health sector [3]. Nurses account for more than half of Chinese health professionals. They are a major force in enhancing medical reform and improving services to benefit people. With the increasing demand for medical and health services, the global demand for nurses is also increasing rapidly (2022) [4]. Several studies have shown that the world is facing a severe shortage of nurses [4, 5]. From a concerning aspect, WHO has

estimated that the global number of nurses will decrease by approximately 7.6 million by 2030 [6]. Some studies have shown that the high turnover rate of nurses is one of the main factors leading to the global shortage of nurses [7, 8].

An increase in nurse turnover will have numerous adverse effects on the health care system. For example, a reduction in the number of experienced professional nurses will increase the lack of human resources and the workload of in-service nurses, thus affecting not only the construction and development of hospital nursing talent teams but also the quality of nursing services and medical safety [9, 10]. In addition, Warshawsky et al. reported that increased nurse turnover leads to an increase in the incidence of falls and stress injuries [11], and increased nurse turnover may even increase the occurrence of adverse outcomes such as patient death [12]. Moreover, the shortage of human resources and the increased turnover of nurses are closely related to the

high costs of recruiting and training new nurses [13]. As a result, nurse turnover is being closely evaluated by health policy makers, hospital managers, and health care institutions worldwide [14, 15]. Studies indicate that the consistent and accurate measurement of turnover is a crucial step in solving the problems of the organizational work environment and the management of nursing staff [16]. Therefore, it is imperative to gain a comprehensive understanding of the current state and variations in nurse turnover rates, which would be beneficial in implementing more effective strategies to reduce workforce attrition.

At present, many published cross-sectional studies have mostly included nurse turnover tendency as being the main outcome variable and explored the relationship between one or more groups of factors and nurse turnover tendency [17–20]. However, a greater turnover tendency may not lead to actual turnover, and an exploration of the situations or factors influencing nurses who have actually left their positions may be of more practical value and guiding significance. To the best of our knowledge, there are few internationally published articles on nurse turnover rates. Some recent studies have measured the turnover rate of nurses in emergency departments, ICUs, and obstetrics and gynecology departments. Several studies have also examined the turnover of nurses in specific countries or regions (such as the USA and South Korea). A comparative review of nurse turnover costs reported nurse turnover rates of 44.3%, 26.8%, 19.9%, and 15.1% in four countries, including New Zealand, the USA, Canada, and Australia, respectively [21]. Chen et al. reported that the turnover rate of nurses in Taiwan was 8.9%, which is low [22].

In conclusion, given that the turnover rate varies greatly among countries, it is necessary to assess the global combined nurse turnover rate with scientific methods and comprehensive retrieval strategies. The purpose of this study was to provide relevant information and evidence for health policy makers and hospital managers by conducting a comprehensive search and scientific analysis of the current literature.

2. Materials and Methods

This study was completed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement. The protocol was registered on PROSPERO (registration number: CRD42023389556).

2.1. Search Strategy. The PubMed, Web of Science, Embase, CINAHL, and Cochrane Library databases were searched for related articles from January 1, 2000, to February 1, 2023. To ensure that the relevant literature was collected as comprehensively as possible, a large set of search terms was used. These search terms were developed by using free terms and subject terms and combined with the Boolean operator OR/AND. The search terms included nurse*, attrition, leave*, turnover, and quit. The utilized search strategy for each database is provided in Appendix A. The exact combination of search terms was (attrition OR leave* OR turnover OR

quit) AND (nurse*). Furthermore, studies were selected by manually searching the references to determine the comprehensiveness of the search.

2.2. Inclusion and Exclusion Criteria. According to the PRISMA statement, the following inclusion criteria, which are shown by using the PICOS framework, were used: participants (P), clinical nurses working in the hospital (nurse practitioners (LPNs)); intervention (I), not applicable; comparison (C), not applicable; outcomes (O), overall turnover rates, or sufficient raw data for calculation; and study design (S), cross-sectional studies, cohort studies, and population-based longitudinal studies.

The exclusion criteria were as follows: (1) meeting, reviews, case reports, letters, or editorials; (2) studies for which the full text was not available; (3) studies with incomplete data; (4) articles published in languages other than English; and (5) studies with a sample size less than 100.

2.3. Data Extraction. The study selection process was performed by two investigators (LP and YC). After removing duplicate studies, the titles, abstracts, and full texts of the studies were independently screened by using the inclusion and exclusion criteria. Any disagreement between the two assessors was resolved by discussion with a third evaluator (RH).

The two evaluators independently extracted the following data by using standardized data sheets: author, year of publication, study time, country/region, study type, sampling method, survey method, sample size, turnover rate, data source, and participant characteristics (such as mean age and female ratio). A third evaluator (RH) verified the extracted data.

2.4. Risk of Bias Assessment. Two researchers used the bias risk assessment tool that was developed and designed by Hoy and colleagues to determine the internal and external validity of prevalence studies [23], aiming to evaluate the quality of the included studies. This evaluation tool contains two-item subscales (external validity and internal validity), totalling 10 items. Each item is scored as 1 (“yes,” “high quality”) or 0 (“no,” “low quality”). The total score for a study is pooled from all of the item scores. The total possible scores are 9, 6–8, and 0–5, thus representing high, medium, and low quality, respectively. Low-quality studies had a high risk of bias; therefore, they were excluded from this study. The risk of bias assessment was conducted by LP and counterchecked by YC, with discrepancies resolved by RH.

2.5. Data Synthesis. The turnover rate (p) was calculated via the following equation:

$$\text{Turnover rate } (p) = \frac{\text{nurse turnover (number of nurses)}}{\text{total number of nurses sampled } (N)} \quad (1)$$

The standard error (SE) of the nurse turnover rate [24] was computed by using the following formula:

$$SE = \sqrt{\frac{p(1-p)}{n}} \quad (2)$$

2.6. Data Analysis. Due to the heterogeneity between the studies, a random effect model with a confidence interval (CI) of 95% was used [25]. All of the statistical analyses were performed by using STATA 17.

Statistical heterogeneity was assessed by using the I^2 statistic, with I^2 values of 25%, 50%, and 75% indicating mild, moderate, and high heterogeneity, respectively. An I^2 value lower than 50% was considered to be acceptable [26]. Subgroup analyses were conducted for region, sample size (<1,653 and \geq 1,654 participants), time of survey initiation (2000–2008 and 2009–2019), year of publication (2003–2014 and 2015–2023), data sources, and departments. Moreover, to determine the factors associated with the nurse turnover rate, the hazard ratios (HRs) and 95% confidence intervals (CIs) of the influencing factors were combined and examined in a random effects model. Group analysis by sex, labour union, hospital size, work environment satisfaction, and job content satisfaction was performed to test the influence of relevant factors. Publication bias was assessed by using funnel plots and Begg's test [27], and the robustness of the findings was determined via sensitivity analysis. A $P < 0.05$ (two-sided test) was considered to indicate statistical significance.

3. Results

3.1. Summary of the Search Results. Twenty-one studies were ultimately included in this meta-analysis. Initially, 48,157 records were retrieved from 5 databases, of which 21,938 duplicates were removed, thus resulting in 26,219 studies. After screening the titles and/or abstracts, 193 studies were included in the full-text evaluation. According to the exclusion criteria, 69 studies were excluded due to inconsistent study type, 25 studies were excluded for being published in languages other than English, 30 studies were excluded for having incomplete relevant data, 5 studies were excluded for having a sample size <100, and 9 studies were excluded for being low-quality studies. Ultimately, the meta-analysis included 21 studies [16, 22, 28–46]. The details of the screening process are shown in Figure 1.

3.2. Description of the Included Studies. The characteristics of the 21 studies that were included in this meta-analysis are presented in Table 1. The studies were published between 2003 and 2023. These studies included 213,314 nurses from 14 countries with sample sizes ranging from 226 to 96,158. The age of the study participants ranged from 23 years to 46.9 years. Regarding the geographical regions, the number of studies conducted in Asia (8) and North America (7) was close. Conversely, Oceania, Europe, and Africa are represented equally, each contributing two studies to the analysis.

3.3. Methodological Quality. In this study, a methodological quality assessment of 21 studies was conducted by using the risk of bias assessment tool developed by Hoy and

colleagues, and details of the assessment process are provided in Table 2. Five studies exhibited high quality, achieving scores ranging from 9 to 10. Sixteen studies were of moderate quality, with scores between 6 and 8 points. The average quality score of the 21 studies was 7.

3.4. Pooled Prevalence of Nurses' Turnover. The distribution of turnover rates across the studies ranged from 8% to 36.6%. A study conducted in Jordan had the highest turnover rate, and a study conducted in the United States had the lowest turnover rate. Random effects models were used due to the significant degree of heterogeneity ($I^2 = 98.61\%$, $P < 0.01$).

The meta-analysis demonstrated a global nurse turnover rate of 16% (95% CI: 0.14, 0.17). Figure 2 shows the forest plots obtained from the meta-analysis. The funnel plot showed asymmetry (Figure 3), and Begg's test showed that there was no significant publication bias ($P = 0.695$).

3.5. Sensitivity Analyses. A sensitivity analysis was conducted on the 21 articles included (Figure 4) using Stata 17 to assess the robustness of the meta-analysis results. After eliminating each single study, there was no significant difference between the combined effect value and the total combined value, thus indicating that the results of this study had good stability.

3.6. Subgroup Analyses. To explore the sources of heterogeneity, we performed subgroup analyses based on region, sample size, study start time, publication year, data sources, and departments (Table 3). The study demonstrated that the turnover rate of nurses in Asia (19%; 95% CI: 0.14, 0.23) was greater than that in North America (15%; 95% CI: 0.13, 0.17), but there was no significant difference between the subgroups. Similarly, no significant differences were found across varying sample sizes (Figure 5).

According to a subgroup analysis by year of publication, the global nurse turnover rate was higher from 2003 to 2014 at 17% (95% CI: 0.14, 0.21) compared to 14% from 2015 to 2023 (95% CI: 0.12, 0.16). Analysis by study start time showed turnover rates of 18% (95% CI: 0.14, 0.21) from 2000 to 2008 and 13% (95% CI: 0.12, 0.16) from 2009 to 2019, with this difference being statistically significant ($P = 0.025$) (Figure 6).

Subgroup analysis by the data source revealed that global nurse turnover rates were higher in studies using databases at 18% (95% CI: 0.16, 0.20) compared to those using hospital data at 12% (95% CI: 0.10, 0.15), a statistically significant difference ($P < 0.001$) (Figure 7).

Five articles reported on the turnover rate of department nurses [22, 38, 41, 44, 45]. According to the subgroup analysis by department, the turnover rate of ICU nurses was 23% (95% CI: 12%–34%) and the turnover rate of obstetrics and gynecology nurses was 16% (95% CI: 11%–22%) (Figure 8).

3.7. Factors Associated with Nurse Turnover. Four articles reported on the factors associated with turnover [30, 36, 42, 45]. The analysis of group differences demonstrated

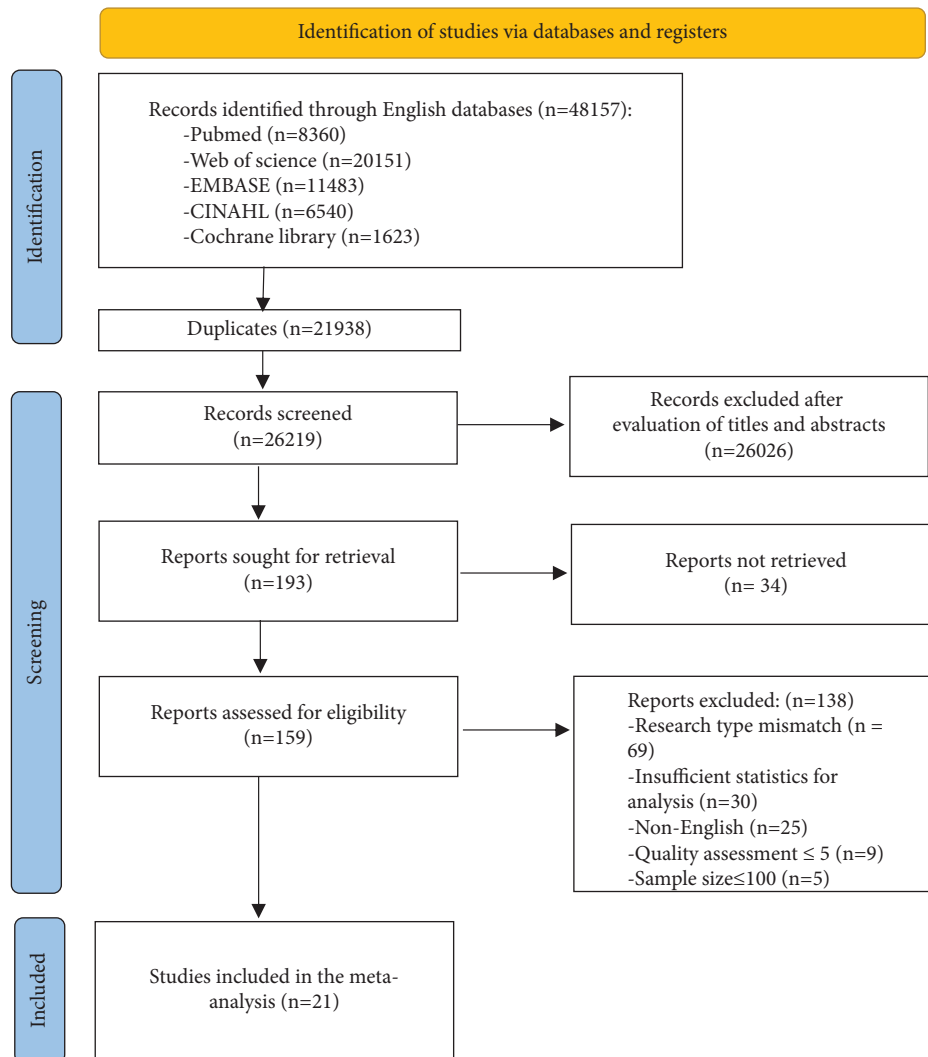


FIGURE 1: Flow diagram of study selection.

that the main factors included sex, labour unions, hospital size, work environment satisfaction, and job content satisfaction (Table 4). Specifically, nurses who were not members of trade unions (HR = 0.62, 95% CI: 0.51–0.77), worked in smaller hospitals (HR = 2.99, 95% CI: 2.89–3.10), were dissatisfied with their work environment (HR = 2.12, 95% CI: 1.40–3.23), or were dissatisfied with their work content (HR = 1.76, 95% CI: 1.21–2.55) were more likely to leave.

4. Discussion

Nurse turnover is an important issue that has attracted widespread attention from health care institutions worldwide. The World Health Organization has called for increased investment in human resources for nurses and advocates for policy attention and support through education, training, regulation, and employment systems [47]. Although the reported worldwide nurse turnover rates are inconsistent, higher nurse turnover rates will undoubtedly have a serious negative impact on the health care system, not

only causing greater economic burdens for medical institutions but also potentially having adverse effects on the allocation of nursing human resources, nurses' job satisfaction, and patients' health outcomes [48]. Consequently, this study represents a leading meta-analysis that provides a comprehensive estimate of the prevalence of nursing turnover from a global perspective.

4.1. Combined Prevalence of Nurses' Turnover. This study synthesizes results from 21 studies published between 2003 and 2023, involving 213,314 nurses from 14 countries. It found that nurses' turnover rates range from 8% to 36.6%, with a global combined rate of 16% (95% CI: 14%–17%). These data are similar to the 18% nurse turnover rate reported in 2024 [49]. According to other studies, the turnover rate of nurses is generally greater than that of other professionals in the health care field [50] thus indicating that the issue of staff turnover may be more pronounced in the nursing industry. The high overall prevalence rate once again underscores that nurses' turnover rate is a concern

TABLE 1: Characteristics of the included studies.

No	Author (year)	Country	Year	Study design	Sampling method	Survey method	Sample size	Turnover rate (%)	Data source	Mean age (years)	Female (%)
1	Andreyeva et al. [28] (2023)	US	2016-2017	CS	General survey	NR	7,634	19	Database	39.5	91.3
2	Brewer et al. [29] (2012)	US	2006-2007	LS	Random	E-mail	1,653	15	Hospital	32	91
3	Chen et al. [22] (2021)	China	2017-2018	Co	Convenience sampling	Questionnaire	553	8.9	Hospital	30	91.1
4	Cho et al. [30] (2012)	Korea	2006-2008	CS	Multistage stratified sampling	Questionnaire	351	17.7	Database	24.2	96
5	Dewanto and Wardhani [31] (2018)	Indonesia	NR	CS	NR	NR	515	15	Hospital	NR	67.6
6	Dexter et al. [32] (2021)	US	2016-2017	CS	Random	Questionnaire	50,273	13.6	Database	NR	NR
7	Gesese et al. [33] (2016)	Ethiopia	2009-2014	CS	Simple random sampling	Questionnaire	1,358	13.4	Hospital	NR	NR
8	Hayajneh et al. [34] (2009)	Jordanian	2006-2007	CS	Random	Telephone survey	2,126	36.6	Database	NR	48.5
9	Kelly et al. [35] (2021)	US	2018-2019	CS	General survey	E-mail	1,688	8	Hospital	39.9	89
10	Kovner et al. [16] (2014)	US	2004-2005	LS	Random	E-mail	750	13.4	Database	NR	NR
11	Lee [36] (2019)	Korea	2008-2010	LS	Stratified random sampling	NR	652	25	Database	24.8	90.5
12	Mathisen et al. [37] (2021)	Danish	2014	Co	General survey	NR	8,768	10.8	Database	NR	NR
13	McCarthy et al. [38] (2003)	Ireland	2000-2001	CS	General survey	Questionnaire	834	18.5	Database	NR	NR
14	Nooney et al. [39] (2010)	US	2004	CS	General survey	Telephone survey	26,472	12.6	Database	46.9	94.1
15	North et al. [40] (2014)	New Zealand	2005-2010	Co	NR	NR	1,236	17.8	Database	30.3	94
16	O'Brien-Pallas et al. [41] (2010)	Canadian	2005-2006	CS	General survey	NR	4,481	19.9	Database	38.9	NR
17	Park and Ko [42] (2020)	Korea	2011-2016	Co	General survey	E-mail	96,158	17	Database	NR	97.6
18	Roche et al. [43] (2015)	Australia	2008-2010	LS	NR	NR	1,673	15.1	Hospital	39.2	NR
19	Rouleau et al. [44] (2012)	Senegal	2007-2008	LS	NR	Questionnaire	226	18	Hospital	40.4	NR
20	Suzuki et al. [45] (2008)	Japan	2003-2005	Co	NR	Questionnaire	923	12.7	Hospital	23	96.4
21	Toren et al. [46] (2012)	Israel	2008-2009	CS	Random	Telephone survey	2,098	16	Database	43	88

LS: longitudinal study; CS: cross-sectional study; Co: cohort study; Year: year of data collection; NR: not reported.

TABLE 2: Quality Assessment for included studies.

Author (year)	Risk of bias assessment tool item										Total score
	1	2	3	4	5	6	7	8	9	10	
Andreyeva et al. [28] (2023)	1	1	1	0	1	1	0	1	1	1	8
Brewer et al. [29] (2012)	1	1	1	0	1	1	1	1	1	1	9
Chen et al. [22] (2021)	1	1	1	1	1	1	0	1	1	1	9
Cho et al. [30] (2012)	1	1	1	0	1	1	0	1	0	0	6
Dewanto and Wardhani [31] (2018)	1	0	0	0	1	0	1	1	1	1	6
Dexter et al. [32] (2021)	1	1	1	0	1	0	0	1	1	0	6
Gesesew et al. [33] (2016)	1	1	1	1	1	0	0	1	1	1	8
Hayajneh et al. [34] (2009)	1	1	1	1	1	1	1	1	1	1	10
Kelly et al. [35] (2021)	1	0	0	0	1	0	1	1	1	1	6
Kovner et al. [16] (2014)	1	1	1	0	1	1	1	0	1	1	8
Lee [36] (2019)	1	1	1	0	1	0	0	1	1	0	6
Mathisen et al. [37] (2021)	1	1	1	1	1	1	0	1	1	1	9
McCarthy et al. [38] (2003)	1	1	1	1	1	0	0	1	1	1	8
Nooney et al. [39] (2010)	1	1	1	0	1	1	0	1	0	0	6
North et al. [40] (2014)	1	0	0	1	1	0	0	1	1	1	6
O'Brien-Pallas et al. [41] (2010)	1	1	1	0	1	0	0	1	1	0	6
Park and Ko [42] (2020)	1	1	1	1	1	1	0	1	1	1	9
Roche et al. [43] (2015)	1	0	0	0	1	1	1	1	1	0	6
Rouleau et al. [44] (2012)	1	0	0	0	1	1	0	1	1	1	6
Suzuki et al. [45] (2008)	1	0	0	1	1	0	0	1	1	1	6
Toren et al. [46] (2012)	1	1	1	0	1	1	0	1	1	1	8

warranting attention, with an urgent need for additional efforts to mitigate attrition in this workforce. However, due to variations in the definitions and measurement methods of nurse turnover rates among the studies in this meta-analysis, future research requires a unified definition and standardized measurement approach to more accurately assess and compare nurse turnover rates. Moreover, given that differences in health care systems, employment settings, cultural contexts, and professional standards across countries could affect the outcomes, significant heterogeneity may exist in the pooled results. Therefore, the combined prevalence estimates should be interpreted with caution. Furthermore, identifying the factors that could influence the turnover rate among nurses is also a critical issue.

Thus, this study conducted subgroup analyses to investigate the sources of the observed high heterogeneity in differences.

4.2. Geographical Region. This meta-analysis showed that the turnover rate of nurses in Asia (19%) was higher than in North America (15%), which may be attributed to different economic and cultural systems, as well as the management and operation modes of hospitals. Economically developed areas often offer more employment options, and nurses may find jobs with higher pay, better working conditions, or more prospects. Moreover, the lower nurse turnover rate in North America may be due to its health care systems placing greater emphasis on this issue, as evidenced by more extensive research conducted there. Another major reason may be related to the shortage of nurses in Asia. With respect to the global population, Asia ranks first and its nurse-patient ratio is seriously unbalanced. A survey demonstrated that the density of nurses in Asia is lower than the global

density [51], and a shortage of nurses directly increases the workload of working nurses and negatively affects their job satisfaction, thus increasing the possibility of nurse turnover [52, 53]. In contrast, the limited research on nurse turnover in Africa (54.4%) suggests less attention to the issue in these regions. More studies in the future could help refine these estimates globally.

4.3. Time of Publication and Study Start Time. The original studies that were included in this meta-analysis were published between 2003 and 2023. Subgroup analysis demonstrated that the global combined nurse turnover rate from 2015 to 2023 was lower than that from 2003 to 2014. Even for subgroup analysis based on study start time, the global combined nurse turnover rate between 2009 and 2019 was significantly lower than that between 2000 and 2008. The abovementioned studies show that the turnover rate of nurses in the 14 countries that were included in this study has exhibited a declining trend in recent years. This trend aligns with the World Health Organization's repeated emphasis on the importance of nurses, advocating the need to unleash their true potential and ensure that they have the resources and support to meet global health needs [3].

Considering that numerous studies have shown that nurse turnover significantly impacts hospital budgets and health care expenditure costs [43, 48], a growing number of countries worldwide are seeking to maintain the long-term stability of the nurse workforce by reducing nurse turnover. On the other hand, the education and professional skill levels of nurses have notably increased over the past two decades, leading to an enhanced sense of professional identity, which has been identified as one of the main factors in the

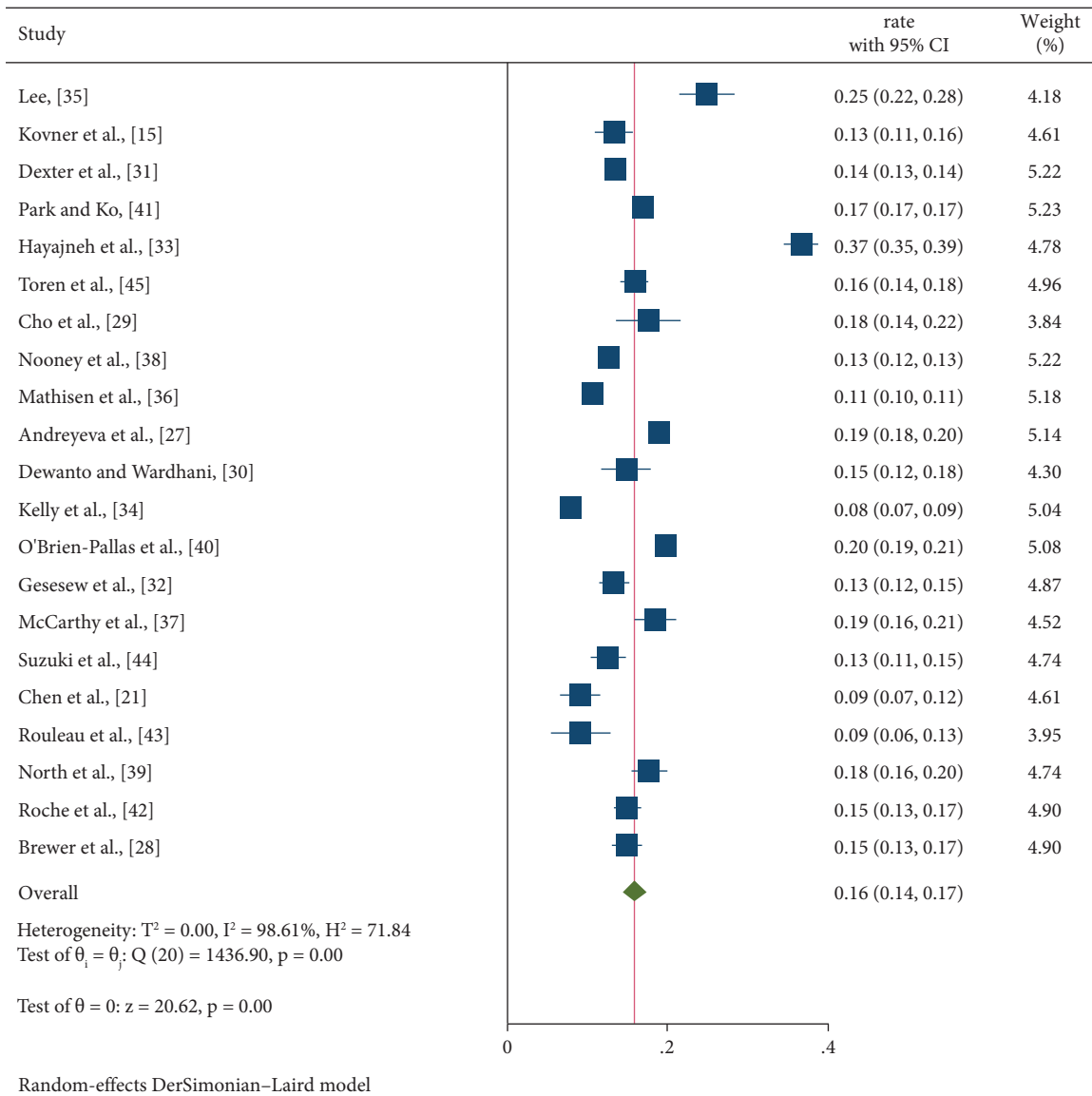


FIGURE 2: Pooled random effects turnover rate and 95% confidence intervals.

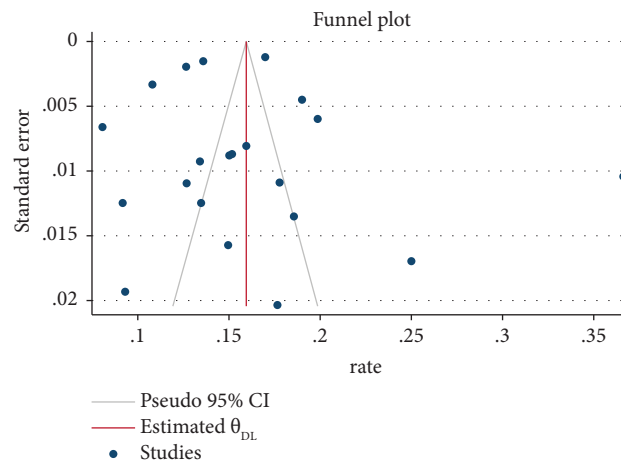


FIGURE 3: Funnel plot of the incidence of turnover.

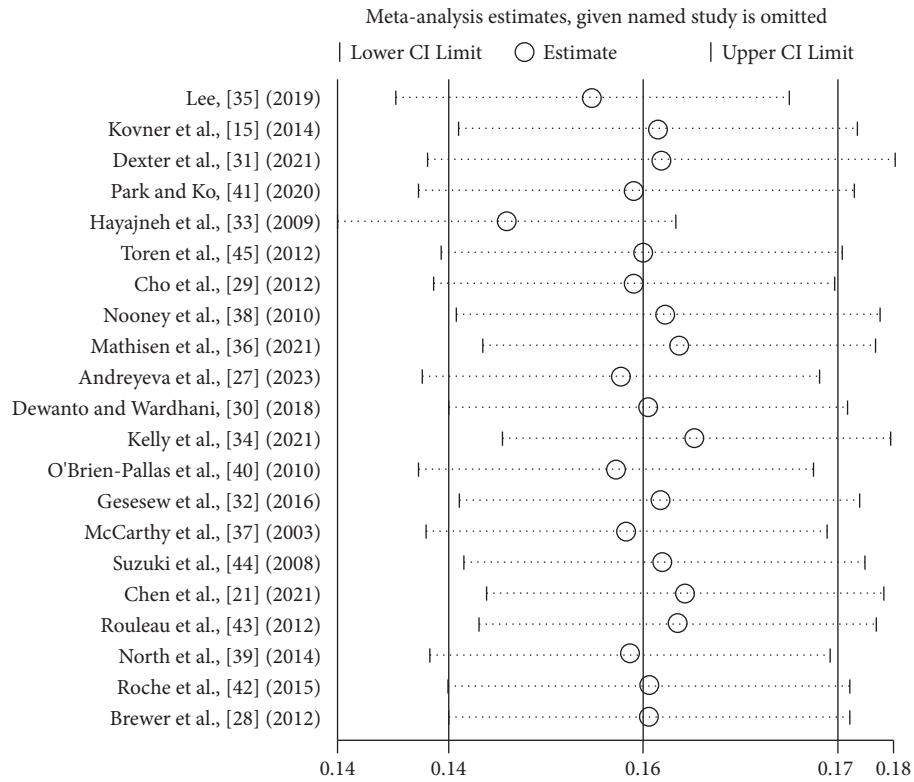


FIGURE 4: Forest plot of the sensitivity analysis.

TABLE 3: Subgroup analysis of the overall turnover rate.

Subgroup	k	Turnover rate (%)	95% CI		I ² (%)	P value	P value across subgroups
			Lower	Upper			
Area							
Asia	8	19	0.14	0.23	98.4	<0.001	0.256
North America	7	15	0.13	0.17	98.3	<0.001	
Other regions	6	14	0.11	0.17	93.9	<0.001	
Sample size							
<1,653	10	15	0.12	0.17	88.9	<0.001	0.183
≥1,654	11	17	0.15	0.19	99.3	<0.001	
Investigation start time							
2000–2008	13	18	0.14	0.21	98.3	<0.001	0.025
2009–2019	7	13	0.12	0.16	99.2	<0.001	
Publication time							
2003–2014	11	17	0.14	0.21	98.5	<0.001	0.189
2015–2023	10	14	0.12	0.16	98.8	<0.001	
Data source							
Databases	13	18	0.16	0.20	99.1	<0.001	0.000
Hospitals	8	12	0.10	0.15	90.4	<0.001	
Department							
ICU	3	23	0.12	0.34	88.5	<0.001	0.288
Obstetrics and gynecology	4	16	0.11	0.22	86.1	<0.001	

reduction of turnover rates [54, 55]. Simultaneously, governments and health systems have become increasingly aware of the vital role of nurses in improving patient health outcomes; thus, they have introduced policies and systems to actively improve the practice environment of nurses and improve their treatment and satisfaction [53, 56].

4.4. Work Department. Subgroup analysis demonstrated that the turnover rate was 23% for nurses working in ICUs and 16% for nurses working in obstetrics and gynecology departments. Nurses working in ICUs and obstetrics and departments have heavy workloads and long working hours; moreover, they frequently work overtime, are in a state of

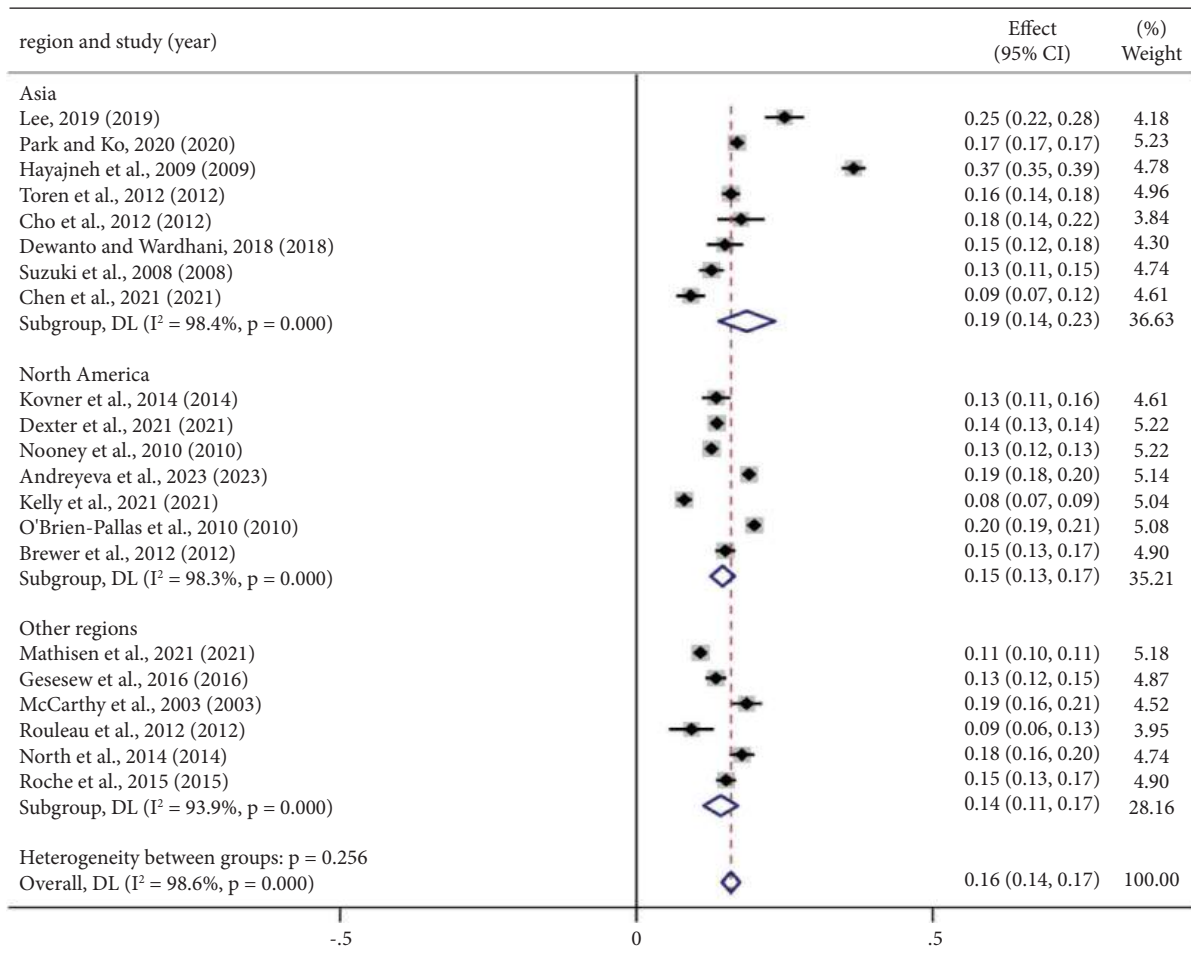


FIGURE 5: According to the region, the turnover rate of nurses.

stress for a long period of time, and bear a considerable psychological burden. Studies have shown that nurses working in ICUs have high levels of stress, dissatisfaction, and job burnout [57, 58], and these factors are the main causes of nurse turnover [59]. These results suggest that nursing managers should prioritize the job satisfaction and physical and mental health of nurses in ICUs and obstetrics and gynecology departments. Appropriate actions, such as reasonable scheduling and increasing staffing, should be taken to reduce turnover rates in these areas.

4.5. Factors Associated with Turnover. Some studies have demonstrated that nurses who were not union members, who worked in smaller hospitals, and who were dissatisfied with the work environment and content were more inclined to depart.

Firstly, hospitals lacking union support may fall short in protecting employee rights, benefits, the work environment, and career development, all of which could lead to higher nurse turnover rates. Additionally, smaller hospitals often experience limitations in offering career development opportunities, creating a positive work environment, and allocating resources. These limitations may include limited

advancement paths, fewer professional training resources, lower social recognition, and greater job stress. These factors collectively may lead nurses to feel constrained in their professional growth, thereby motivating them to seek healthcare institutions that offer broader career prospects and superior working conditions. Research by Park and Ko supports this viewpoint, thus indicating that nurses particularly value opportunities for professional development and the quality of the work environment when evaluating potential job opportunities [42]. Therefore, to attract and retain nursing talent, small hospitals need to improve these critical factors; for instance, they can establish clear career development plans, offer regular professional training, improve working conditions, increase resource allocation, and enhance social recognition of nursing work. Through these measures, small hospitals can create an environment more conducive to nurses' professional growth and personal development.

Moreover, nurse turnover and lower job satisfaction are closely related, which supports the findings of Li et al. [60]; specifically, nurses want to have a cohesive, supportive, and independent practice environment. Hence, it is imperative for hospital managers to establish a practice atmosphere that fosters a cohesive team and supportive management.

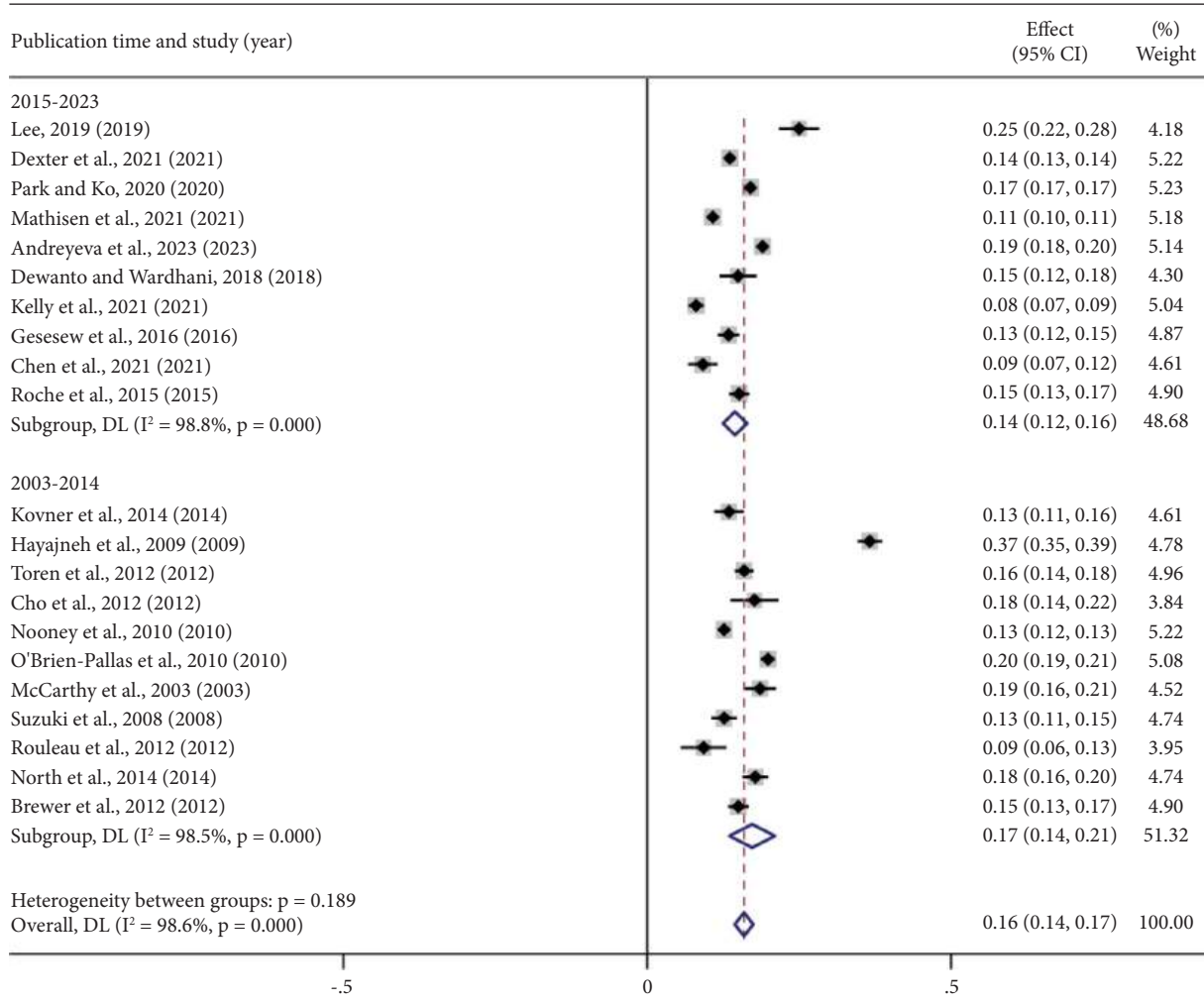


FIGURE 6: According to the publication time, the turnover rate of nurses.

Finally, it would be more appropriate to be conservative in interpreting turnover-related factors because these meta-analyses are based on a limited number of studies. However, these findings provide important insights for future studies. These factors may greatly affect nurses' resignation, thus motivating researchers to conduct relevant large sample experiments in the future.

Obviously, nurse turnover is also influenced by other factors. Jones et al. categorized the reasons for leaving into internal and external factors. Internal reasons primarily include seeking opportunities for career development and advancement, job burnout, a tense work environment, and a lack of good leadership and management. External reasons mainly include nurses pursuing better compensation and benefits, experiencing high job stress, and having inadequate staffing [61]. Lee categorized the main reasons for nurse turnover into personal, hospital, and profession-specific factors. Among personal factors, the turnover rate among men is greater than that among women, which is a result that may partly be attributed to gender imbalance because the nursing profession is still predominantly occupied by women. Additionally, the education level also plays a significant role in

personal factors, as nurses with higher education may have greater capabilities to identify and access information about employment opportunities that are available in the current job market, thus resulting in better career planning. In addition to organizational factors within hospitals, career prospects, autonomy, social esteem, and interpersonal relationships (the satisfaction derived from the profession itself) are also factors affecting nurse turnover [35, 36].

Hayes et al. conducted a detailed analysis of the factors influencing nurse turnover and categorized them into three main areas: organizational factors, personal factors, and factors related to career development and economics. Among the organizational factors, four key points were emphasized: high workload intensity, ongoing stress and burnout, inadequate leadership abilities of managers, lack of empowerment, and high levels of role ambiguity and role conflict are all associated with higher nurse turnover rates. In terms of personal factors, an inverse relationship was reported between age, nurses with family responsibilities (e.g., dependent children or relatives), years of nursing experience, length of time in the position, and likelihood of leaving. Finally, in terms of career development and economic

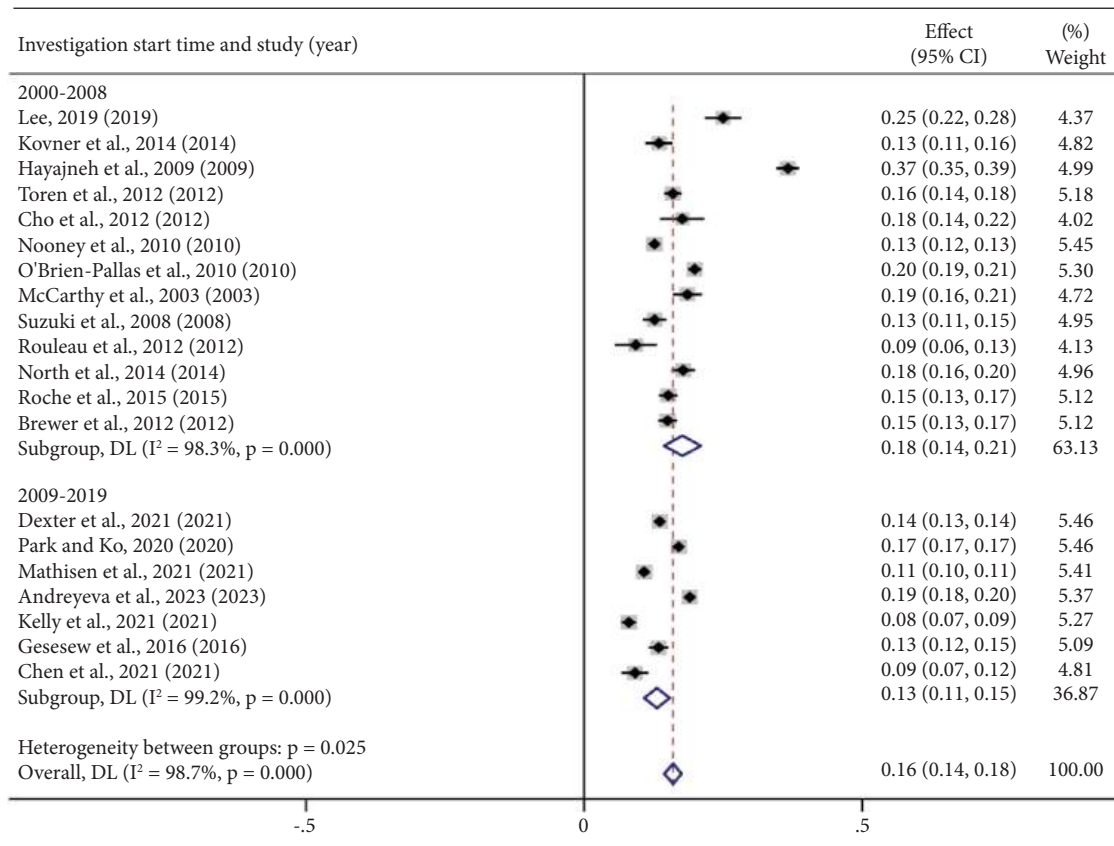


FIGURE 7: According to the investigation start time, the turnover rate of nurses.

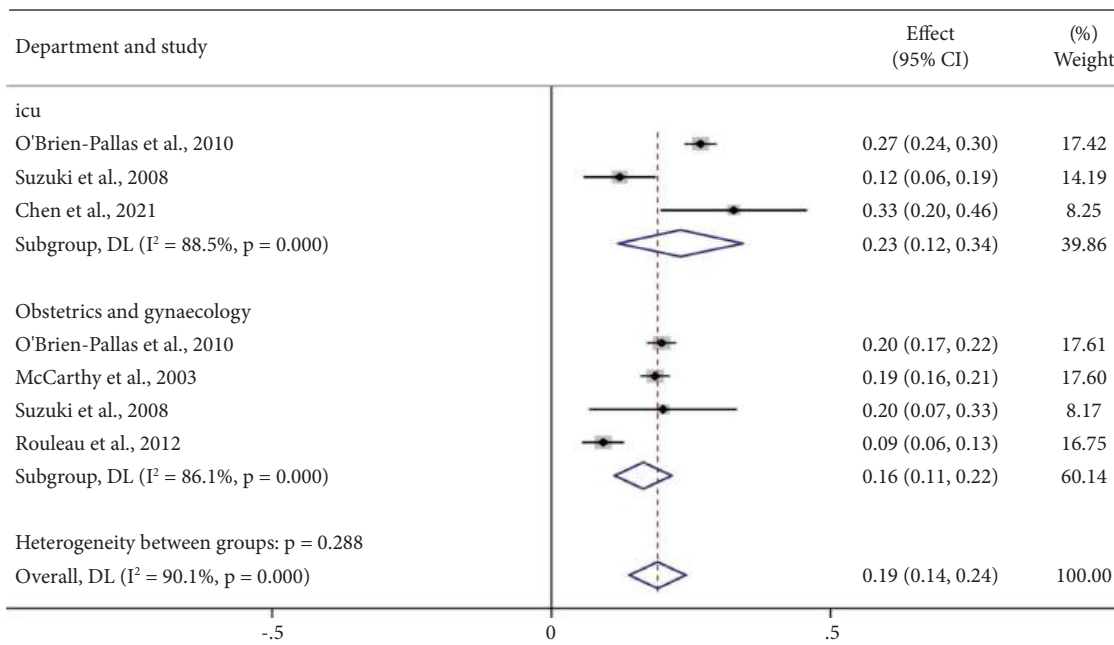


FIGURE 8: According to department, the turnover rate of nurses.

factors, nurses may choose to leave their current positions if they perceive better career development opportunities and compensation benefits that are available elsewhere [62]. To

reduce the turnover rate of nurses, health care institutions need to comprehensively consider these factors and take appropriate measures to address them.

TABLE 4: Meta-analysis of risk factors associated with nurse turnover.

Associated factors	Studies (<i>n</i>)	HR	Lower limit	Upper limit	<i>I</i> ² (%)	<i>P</i> for heterogeneity
Female (ref: male)	2	0.91	0.51	1.62	90.5	0.001
Labour union (no)	2	0.62	0.51	0.77	0.00	0.561
Hospital size (vs. large)						
Small	2	2.99	2.89	3.10	0.00	0.743
Medium	2	1.63	1.59	1.68	0.00	0.941
Workplace dissatisfaction (vs. satisfied or neutral)	3	2.12	1.40	3.23	68.9	0.040
Work content dissatisfaction (vs. satisfied or neutral)	2	1.76	1.21	2.55	50.6	0.155

4.6. Strengths and Limitations. Overall, the study conducted a comprehensive search of the relevant global literature to minimize the risk of omitting studies due to selection bias. Furthermore, through the use of rigorous methodological procedures and statistical analysis, data were collected and aggregated from 213,314 nurses from 14 countries, thus providing a scientific basis for policy makers worldwide who want to address employment stability in the nursing industry. Furthermore, both sensitivity and subgroup analyses were conducted to examine the potential sources of heterogeneity to enhance the rigor and reliability of the study.

In interpreting and applying the findings of this study, certain limitations must be considered. First, to utilize more accurate turnover rate data, certain studies were excluded because they only reported turnover rate, without providing the total employee number or the specific count of individuals who had left. This exclusion may have slightly influenced the study outcomes. Second, there was no clear, consistent definition of “turnover” in the included studies, which potentially led to the possibility of slight bias in the study findings. Moreover, due to the limited information presented by the original studies, there were insufficient data to explore the reasons and factors influencing turnover in this study. Finally, since the majority of the included studies were written in English, interpretations of the research findings should be approached with caution.

Therefore, future studies should include more detailed information on occupation-related, demographic, and family-social aspects, especially regarding the turnover rate of nurses working in different departments with different academic qualifications, ages, marital statuses, and durations of employment, which will be helpful for in-depth analysis of related factors. In addition, when experts and scholars evaluate nurse turnover, there should be a clearer definition of voluntary resignation and dismissal by medical institutions, which will facilitate a more comprehensive comparison. Given that there are few research articles on the nurse turnover rate in various countries that mainly focus on nurses’ turnover intentions, this study suggests that research on groups of nurses who actually leave their positions in the future should be increased. Only by truly understanding the factors influencing turnover in nurses who have left their positions can more accurate and more specific intervention measures or more reasonable policies and systems be formulated to reduce the turnover of nurses.

5. Conclusion

This study analysed existing published studies related to nurse turnover worldwide and demonstrated that the global nurse turnover rate was approximately 16%, thus implying an urgent need for efforts to reduce nurse turnover. High nurse turnover rates were observed in Asia (19%), ICUs (23%), and obstetrics and gynecology departments (16%). This emphasizes the need for health policy makers and nursing managers, particularly in Asia, to focus on reducing turnover in ICU and obstetrics and gynecology settings. The findings of this study underscore the urgent need for future intervention research aimed at reducing turnover among nursing staff, thereby enhancing the quality of patient care. However, research on the turnover rates of this population is relatively new and limited in some continents; therefore, further studies are necessary to more accurately measure the prevalence among this group.

6. Implication for Nursing Management

The study result shows that approximately 16% of nurses have experienced turnover, indicating an urgent need for efforts to reduce turnover. It provides a more comprehensive and objective understanding of nurse turnover for health care policy makers, hospital managers, and nursing leaders. It is suggested that all medical and health institutions actively adopt relevant systems and supporting policies that can reduce the turnover of nurses and promote a more harmonious, healthy, and safe occupational environment for nurses to strengthen the stability and sustainable development capacity of the nurse workforce. To reduce the turnover rate among nurses, it is essential to consider a comprehensive approach that addresses various factors such as the work environment, compensation and benefits, career development, workload, and psychological stress. For instance, human resources should be allocated rationally to reduce nurses’ work stress and increase job satisfaction, adopting scheduling systems and work principles that promote nurses’ physical and mental health. Additionally, establishing an attractive hospital culture can enhance nurses’ sense of belonging and provide personalized, diverse career development opportunities, thereby improving their satisfaction with the professional environment. Furthermore, strengthening public education to increase awareness and understanding of nursing roles will enhance nurses’ professional identity and motivate them actively in their work.

Data Availability

The datasets supporting this meta-analysis are from previously reported studies and datasets, which have been cited. The processed data are available from the corresponding author upon request.

Additional Points

Implications for Nursing Management/Contribution of the Paper. The shortage of nurses and high turnover rates pose significant challenges for healthcare organizations worldwide. Future research on nurse attrition should incorporate more comprehensive occupation-related, demographic, and family-social information, particularly by examining attrition patterns among nurses in different departments, educational backgrounds, age groups, marital statuses, and years of experience. It is crucial to clearly differentiate between voluntary attrition and resignation to provide a solid foundation for healthcare policy makers, administrators, and care leaders in formulating relevant policies. This study has several implications for nursing management. For example, managers must prioritize nurse retention efforts by strategically planning human resources to ensure an adequate nursing workforce that can meet patient needs; moreover, they should offer career advancement opportunities and foster professional development while cultivating a strong team spirit and fostering a positive organizational culture to enhance nurses' sense of belongingness and loyalty. By stabilizing the nursing team through these measures, the quality of nursing services can be improved, thus ultimately leading to better patient care.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

All listed authors (Hui Ren, Pan Li, Yingchun Xue, Xin Yin, Wenhao Xin, and Hongyan Li) meet the authorship criteria and that all authors are in agreement with the content of the manuscript. All the authors substantially contributed to the (1) design of the study, (2) data extraction, data analysis and interpretation, (3) drafting of the article, and (4) approval of the final version for publication. The authors Hui Ren and Pan Li contributed equally to this work and should be considered co-first authors.

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Supplementary Materials

Appendix A: we searched PubMed, Web of Science, Embase, CINAHL, and Cochrane Library databases. The search strategy used for each database is provided in Appendix A. (*Supplementary Materials*)

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Research Article

I Was Merely a Brick in the Game: A Qualitative Study on Registered Nurses' Reasons for Quitting Their Jobs in Hospitals

Josefin Bäckström ^{1,2}, Ulrika Pöder ³, and Ann-Christin Karlsson ³

¹Department of Health, Education and Technology, Nursing and Medical Technology, Luleå University of Technology, SE-971 87 Luleå, Sweden

²Department of Medical Sciences, Psychiatry, Uppsala University, SE-751 85 Uppsala, Sweden

³Department of Public Health and Caring Sciences, Caring Sciences, Uppsala University, SE-751 22 Uppsala, Sweden

Correspondence should be addressed to Josefin Bäckström; josefin.backstrom@neuro.uu.se

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The aim was to explore why registered nurses (RNs) in Sweden choose to quit their jobs in hospitals, also in relation to experienced patient safety. Previous research has shown that nurse turnover, especially in hospital settings, is a serious challenge for society and health care globally. Insufficient staffing of RNs is linked to poorer patient outcomes and a general patient safety at risk. It is, therefore, important to continually explore how nurses describe their reasons for quitting their jobs. The study was conducted using a qualitative descriptive design, based on 11 semistructured interviews with RNs. The analysis generated four categories describing the results: Feeling that the profession is not valued; Psychological and physical symptoms related to work; An insufficient and unsupportive organization; and Unsatisfying leadership and teamwork. Specifically, the RNs participating in this study described a range of reasons for quitting, where the feeling of not being valued and treated as a respected and autonomous profession was a common thread throughout the results. RNs experienced that, overall, the insufficient work conditions, also resulting in lower patient safety, ultimately led to their decision to quit. The findings highlight the crucial need for employers to develop working conditions for RNs, to make sure that the profession is valued according to professional standards and provide the potential for autonomous nursing practice. To reduce nurse turnover, and instead attract and retain nurses, leadership and management in nursing need to be adjusted to meet the demands of a modern academic profession.

1. Introduction

From a global perspective, nurse turnover, which can be defined as employees choosing to leave an organization or workplace, has been a serious challenge for the healthcare sector for decades [1–3]. The healthcare sector has for long been pinpointed as struggling to recruit and retain nurses, even more so in the aftermath of the COVID-19 pandemic [4]. In Sweden, the national situation in acute care hospitals has recently been described by national authorities as alarming and unacceptable regarding patient safety, primarily due to the employers' inability to recruit and retain nurses [5].

The causes of nurse turnover have been studied extensively over the years. Vital aspects that might influence nurses' decision to remain in their workplace are aspects related to leadership and management, career options, organizational environment, and number of colleagues [6, 7]. Additionally, generational differences can play a role [6, 8]. Several of the causes identified in the studies as reasons for why nurses quit, for example, poor work environment, are deemed preventable [9].

Job satisfaction and a healthy work environment are central factors that have an impact on nurses' turnover intentions [10–14]. Qualitative studies have identified a link between a well-functioning work environment and the

quality of patient care involving nurses and nurse midwives [15, 16]. Quantitative research exhibits variations in the definitions of work environment and the source of patient safety ratings, whether derived from nurses or nursing indicators, studies consistently highlight a connection between nurses' work environments and a range of nursing outcomes. These encompass, but are not restricted to, missed care, post-discharge mortality risk, incidents of falls, medication errors, and occurrences of pressure ulcers [14, 17–19]. One central aspect of high-quality care is patient safety, which by definition is fundamental to delivering health care that is effective, safe, and person-centered, and also prevents and reduces risks [20]. The consequences of nurse turnover are not limited to serious economic values but also comprise the effect on staffing and on nurse—as well as patient outcomes [2, 21].

Despite a substantial amount of scientific research on the topic of nurse turnover, myths continue to flourish on why nurses choose to quit, risking meaningless or even counterproductive interventions by employers striving to turn the trend. Previous research has emphasized the need for further studies in this area to focus on equity and the wellbeing of nurses, and on the underlying mechanisms of nurse turnover [21, 22]. Moreover, it is suggested that effective strategies to enhance retention and raise healthcare standards may exhibit variability among hospitals. Accordingly, these intricacies should be considered when devising and implementing interventions targeted at improving nurse retention [6], where qualitative studies are posited to contribute significantly to a more profound understanding of the nuanced and underlying factors influencing nurse turnover. To our knowledge, few qualitative studies have focused on how registered nurses (RNs) in a retrospective perspective describe job satisfaction and patient safety in relation to having quit their jobs, e.g., nurse turnover. Therefore, in this study, we aimed to explore why RNs in Sweden choose to quit their jobs in hospitals, also in relation to patient safety.

2. Materials and Methods

2.1. Design. The study was conducted using a descriptive design with a qualitative approach.

2.2. Informants and Setting. Informants were purposefully recruited through a university hospital with approx. 900 beds, and one county hospital with approx. 160 beds, in two healthcare regions in Sweden. A list of 53 RNs, who had quit their jobs in either medical or surgical units during 2018, was obtained through the respective HR departments. Only RNs on permanent contracts were included. An information letter, including an informed consent form, was sent by regular mail to all the potential informants. The first author made contact by telephone to follow-up on any questions, and if the contacted person was interested in participating, a time for an interview was scheduled. Eleven RNs finally participated. The recruitment resulted in variation regarding age (range 26–63), gender (men and women participated),

and experience as RNs (range 4–34 years since graduation). Four informants held a postgraduate diploma in specialist nursing, with or without an additional one-year master's degree. One participant held a Ph.D.

2.3. Interviews and Procedure. Data were collected from March 2020 to February 2021, using a semistructured interview guide. At the beginning of the interview, the informants were asked to describe some background characteristics. Below are examples of the main questions in the interview.

- (i) How would you describe your job satisfaction as a RN in your former workplace?
- (ii) Can you describe why you experienced/did not experience job satisfaction?
- (iii) Could you describe what would have been important for you to feel job satisfaction?
- (iv) Some describe a relation between job satisfaction and patient safety; what are your thoughts about this—considering your former workplace?
- (v) What are the reasons that you chose to quit your former job?
- (vi) What would make you rethink and return to your former workplace?

Interviews were carried out online or by phone, were audio recorded, and transcribed verbatim including emotional expressions. The interviews ranged between 32 and 62 min.

2.4. Data Analysis. The interviews were analyzed using systematic text condensation inspired by the description by Malterud [23]. The text was read by the authors to identify the preliminary themes. Text units that were considered relevant to the aim were identified and sorted according to these themes. Then, code groups were generated by the first author. Thereafter, all authors were involved in the reformulating and reconstructing of the codes until a consensus was reached. The content in each code group was re-contextualized and, subsequently, synthesized into four categories, describing the results. Illustrative quotes were used to strengthen the credibility of the results.

2.5. Ethical Considerations. All informants had signed a written informed consent form and were asked if anything was unclear before the interview began. All were informed that participation was voluntary and that they could withdraw from participation at any time without an explanation or questions being asked. Informants were told that data would be handled with confidentiality and that data would be presented without exposing any of the informants in a way that could cause them to be identified. None of the informants withdrew from the study. Ethical approval was obtained from the Regional Ethical Review Board (Reg. no. 2016/111).

3. Results

The analysis resulted in four categories which describe the registered nurses' reasons for quitting their jobs in the hospitals, including aspects of patient safety, where it influenced the decision.

3.1. Feeling That the Profession Is Not Valued. The RNs experienced that the employer did not value formal competence, such as a higher academic degree and senior expertise, and that visible career options are lacking. They expressed a wish to develop professionally, but the only career path that was evident was becoming a ward manager, also described as the only way to achieve an increase in salary. The informants felt that the salary was too low in relation to their formal competence and experience, which was an important factor influencing their decision to quit.

RNs felt that their professional development had stagnated, and an increase in salary was seen as impossible to negotiate outside the annual salary evaluation. Informants felt that they were seen as a collective rather than individual professionals, and that individual skills and competencies were not valued. RNs expressed that the employer encompassed a dated view on their competencies, such as the typical skills related to academic degrees in general. Career positions and roles for nurses where the individual's competence was valued were experienced as rare. Academic career paths and roles were not evident, which they expressed should be apparent already upon entering the organization.

Easiest for managers that all [nurses] are the same, just go in and do their job and nothing more. Do not ask any questions or show any personal interest. [...] It is perceived as a problem in healthcare that nurses should preferably be streamlined. Everyone should be equal, be equally experienced, everyone should do the same. (Informant 10)

[...] it's as much about tradition and culture. So that's... it's going to take a very long time to adjust or change. But I think it's about changing one's view of what is the ultimate goal for a nurse simply. [...] Because that's the thing with, should we be seen as a bit, like just a name on the schedule, or should we be seen as a competent [professional], so. And that is, of course, you must not close your eyes to the fact that we all need to fill a gap for care to work, of course. We need to make sure that there are nurses in place, but then you need to create a tradition and culture that sees the importance of our core competence. (Informant 8)

3.2. Psychological and Physical Symptoms Related to Work. The overwhelming work situation with extreme stress was described as causing both physical and psychological symptoms, leading to an unbearable situation. Being physically tired but still not being able to relax, constant stress, and having a stomach in knots, the feeling that "I am going to die here," not being able to think, not being able to concentrate, experiencing cold sweat, a racing heart, and the

feeling of "enough is enough" – all contributed to making the decision to quit. The stress caused RNs to feel their head spinning with thoughts after getting home from work and made it difficult for them to regain energy. Knowing that the stress caused dangerous situations for the patients added to the feeling of unsatisfying work situation. The stress and the overall work environment were described as a risk factor for missed care, threatening patient safety.

[...] I couldn't think, I didn't know what... I didn't know the time, I could concentrate on... or I couldn't sleep, because I was working three shifts. (Informant 5)

And if I want to be at work then, maybe I am happier, have more energy and have more motivation to work, which then... My attitude toward my work affects the patients, because they see me at my job. If I'm angry, sad or happy, it probably shows in me and how I behave toward the patients. And if I then feel unmotivated and depressed or feel "oh God, what a job... I don't even want to be here," I might miss certain things that my patient says, for example, just because I think that... or in case I have my thoughts in another place, etcetera. So, there are so many different factors that come into play. So, I definitely think that if you are satisfied, there will be increased patient safety. I think, it will definitely be. (Informant 1)

3.3. An Insufficient and Unsupportive Organization. RNs felt that an organization in the workplace supporting nursing was lacking, making it tough to perform their duties according to the professional nursing standards. The working environment was described as important, both to ensure patient safety and as an overall important aspect of work satisfaction. Permanent and extensive understaffing, especially regarding RNs, was viewed as having a substantial impact on the decision to quit. Due to the extreme work overload, sometimes the informants could not see the patients they were supposed to care for during a whole shift and had to discuss patients during rounds that they had not even met themselves. RNs were aware that patients needed them and that they were very ill – not being able to attend to their needs caused stress and made them feel they were not doing a professional job. They had difficulties in finding the time to even go to the bathroom themselves. Having to supervise students continually, and at the same time feeling new in the profession, added to the general burden and stress. Feeling bad toward colleagues was experienced as disheartening. Newly recruited colleagues could leave the workplace within months, and some even chose to leave the profession within a year.

[...] if you think about patient safety in the care unit, it means that resources must be available so that you can do your job and have time to see the patients. I feel that, it's really the most important thing, organizationally speaking. That it improves... yes, you need to have staffing and you need to have time, so that you have time to see your patients. Among the worst shifts is where you don't have time to see patients. (Informant 12)

Situations when the RNs had to care for patients who were outsourced to other wards than the one intended were described as especially stressful, since they did not feel they possessed the adequate competence and experience regarding the specific condition for which the patient was getting treatment.

There were a lot of shifts where [...] you found your nursing colleagues in the medicine room crying, and I never thought I'd be a part of that. But I was involved. (Informant 1)

Informants described that the working hours and scheduling had played an important role in the decision to quit. Work schedules were described as lacking flexibility, and the employer was unwilling to consider individual needs when organizing the schedule. Especially working days, evenings, and nights in a mix—sometimes resulting in only a few hours of sleep before the next shift—was deemed especially draining. The inflexible schedules were viewed as something that could cause illness and made it impossible to have a social life outside of work and to manage family obligations.

[...] it was this shift, above all, that it was so very messy with day, evening, day, evening and then every other weekend. So that was probably the big thing. (Informant 14)

[...] so it's development opportunities, it's the salary issue, it's the working environment. Then I would say . . . part of this, which I have admittedly been a little bit into, but which I have reflected on a lot, is connected to this thing of working three shifts and doing a rotation. But it's really about flexibility, in terms of working hours. Because it is also the case that people find themselves in different situations in one's life during one's life cycle. (Informant 8)

3.4. Unsatisfying Leadership and Teamwork. The RNs described leadership as a crucial factor influencing their decision to quit. This was described in terms of collegial support from both senior colleagues and from managers. Informants felt abandoned when being the only one that others turned to for advice and support, while they had no support from senior colleagues themselves; instead, they were solely dependent on the hospital physician on-call. Managers did not offer support, and nursing assistants were sometimes the only ones in the team with a longer experience. This was described as unsatisfying, since assistants lack knowledge of the scope of practice for RNs. Clinical supervision in nursing and senior support from colleagues with a higher qualification was described as necessary, but nurse practitioners and RNs with specialist competence were viewed as being too busy to provide adequate support. Informants also acknowledged that managers find themselves in unbearable situations where they are aware of the shortcomings and the poor work environment. Managers were also described as absent, not taking responsibility, and blaming each other—problems that were addressed were met with no response.

I think there is a lack of support and guidance in that case. Because I think that regardless of whether you are in a very critical or stressful situation, and you have colleagues next to you who can support you, I think that you can feel satisfied after a work shift. But if you don't have that, I think there is a lot that is missing. Because several times, I even thought, "no, but this is not the profession I should have anymore." (Informant 1)

Nursing management was described as insufficient and lacking leadership that would have been required to create an attractive work environment. Managers were experienced as absent and lacking interest in patient safety and the situation of the employees. Informants experienced that managers did not adequately address the individual professionals' interests, neglecting to value competencies and promote lifelong learning. Negative feedback and a lack of positive feedback were deemed discouraging. RNs described that managers were often new in their positions and were changed frequently. Managers' formal qualifications were questioned when they expressed a lack of interest in academic merits—something that informants could experience as a reason for quitting after they had accomplished a higher degree themselves.

They may not be disinterested, but it is probably overshadowed by the fact that they have other problems, organizational problems. That the department should be staffed 24 hours, with the right professions, that . . . yes. I don't think they are completely disinterested, but they are not schooled in it either, since there were two non-academic nurses [managers] at the time. Or one was academic but had no interest in academia . . . (Informant 10)

And, of course, I can also turn to my assistant nurses. We had a lot of people who were experienced and had worked there for ten, fifteen years. But they are not familiar with this particular . . . in our profession and what we do; so, it felt like I was talking to a wall sometimes. And when you tried to contact the manager about these problems, it wasn't often that they were there either. Or they were in meetings, were busy with something completely different, and didn't have time. So, it was probably a big part of why I finally felt that "enough is enough." (Informant 1)

RNs also described that a hierarchical structure in the workplace, lacking team collaboration and including interprofessional relations, contributed to their decision to leave. Physicians could be unfriendly and unsupportive; also, other RNs could act hostile, for example, when a colleague had achieved a new formal qualification, such as a higher academic degree. The overall atmosphere could be negative and unsupportive. Physicians could demand to be formally titled, and RNs could be ignored when greeting them. Rude behavior from physicians toward RNs was experienced as diminishing, and nursing as a profession was viewed as having an overall low status in the organization. Male RNs were deemed to be less exposed to hostile behavior than female RNs. Moreover, informants thought that a lack of

informal socializing between physicians and RNs had a negative impact on the teamwork. They also experienced an overall inequality between professions in the hospital, namely, that physicians have a clearer career path than they themselves after professional achievements, including academic degrees.

I had a situation when I was fairly new and working nights, where I was scolded for even daring to ring the back-up on call doctor instead of the primary on call doctor. But I thought, he didn't take me seriously. And when you called the back-up on call doctor, there was still someone who listened to you straight away. And then we could still help the patient, but then you were scolded for doing it that way. (Informant 4)

4. Discussion

The results in this study comprise four categories: Feeling that the profession is not valued, Psychological and physical symptoms related to work, An insufficient and unsupportive organization, and Unsatisfying leadership and teamwork. RNs who have chosen to leave their jobs as registered nurses in an acute care hospital describe a range of reasons for doing so. There were various reasons including feeling overwhelmed, consequences related to stress; a lack of a patient safety culture; an overarching experience of being treated unfairly and not according to what would be expected based on qualifications; not having the prerequisites required to practice their profession; poor leadership; and a lack of a nursing organization and insufficient career options, together with dysfunctional interprofessional teamwork.

The results show that the RNs' work situation with experiences of extreme stress caused both psychological and physical symptoms, experienced as linked to threatened patient safety. This is consistent with previous research regarding RNs' experiences of round-the-clock care, and how constant stress might have a serious impact on health and well-being, underpinning the decision to leave the workplace [16], with the feeling that "enough is enough." RNs felt the stress, along with a lack of recovery and replenishment of new energy between work shifts, was a risk factor for missed nursing care, thus experienced as threatening patient safety. This missed nursing care, also described as care left undone [24, 25] or unfinished nursing care [26], has been associated with lower patient safety [19, 27]. Missed nursing care, apart from the consequences for the patients, is associated with absenteeism, job dissatisfaction [28–32], poor retention and staff morale, turnover intention of nursing staff [26], but most of all, a burden on patient safety [19, 33]. Identifying current and up-to-date research in line with the findings in this study, unsurprisingly, did not present a challenge. This can be seen as noteworthy, since the topic has been addressed for decades, pointing out basically the same challenges and consequences for both patient safety and nursing as a profession [34, 35]. This highlights the utmost importance that the, now, substantial scientific evidence on factors affecting work environment and nurse

turnover [10–14] should seriously be considered in national and international policy, and by decision-makers in healthcare at all levels.

A connecting thread running through the categories was that the RNs in this study did not experience that they were treated as a respected *profession* by their employer, but rather as a replaceable workforce with a modest professional value to the organization. This shed further light on aspects of how RNs can be understood in large organizations, such as hospitals, and underlying aspects of what needs to be taken into account in reforming such organizations in order to facilitate recruitment and retention of RNs.

Employers were described as comprising an outdated view on RNs, not corresponding to what would be expected regarding a profession. Few visible career options, besides positions in ward management, were offered; moreover, employers did not seem to value higher academic degrees. Expectations on professional development were not met; furthermore, the working conditions, including salaries, did not make the RN's feel valued. These results are congruent with previous research in Swedish contexts, indicating that employers might not seek out autonomous academically trained professionals when recruiting RNs, but rather a workforce that is primarily expected to act as independent medical assistants, valued for their practical skills and dedication [36]. The medical perspective has been dominant in healthcare for centuries; it is only in the past decades that it has been challenged by other more holistic approaches to health [37], such as nursing, which originates from a holistic, caring, and person-centered approach to health [38]. Perhaps partly explained by being a "new profession" [39], RNs have struggled to gain influence and power, both in health policy as well as in hospital organizations. Nursing is still commonly seen as subordinate to medicine by the society [40]. This perception is also reflected by the results in our study, describing unequal career options compared to physicians and unsatisfactory interprofessional teamwork, where RNs might experience derogatory behavior from physicians. *If* the profession is still seen as subordinate to physicians, both in the team and at the organizational level, it might come as no surprise that RNs experience treatment as disparaging, and that such experiences in the long-term contribute to their decision to quit.

Somewhat surprisingly, the RNs in this study did not specifically bring up the need for an overarching structure for nursing leadership, although deficient and incompetent management at the ward level was emphasized as a reason for quitting. The explanation for this remains unclear, given that the specific question on overarching organizational leadership structures was not addressed in the interviews. Rodríguez-Pérez et al. [40] have articulated a need for nurses to strengthen their influence and leadership by gaining positions in faculty, professional organizations, and in health policy. Leadership, in general, is a central reason for nurse turnover, described in this study as well as in a substantial number of previous research studies [6, 7]. Regardless of the fact that healthcare organizations are constantly changing, thus affecting the healthcare staff [41, 42], it is unclear to what extent the professionalization of nursing [39] has had an impact on

organization, and employers' core views on nursing as a profession. The introduction of new public management [43] in healthcare has also been pointed out as reducing professional governance and influence in general, conceivably making it even more difficult for new professions to strengthen their mandates in such organizations. In continuously slimming organizations such as acute hospitals, traditionally run by the dominating medical perspective [37], it is conceivable that nurses have not reflected upon, or been able to influence the organization enough to create a career structure, allowing the profession to grow and develop substantially, also beyond bedside nursing.

As pointed out in previous research [44], organizational change in healthcare is best received when staff experience the need and value for change, especially regarding better patient care. The experiences shared by the RNs in this study indicate that the organizations they worked in had not fully integrated the status and value of them as full professionals. Not all hospitals in Sweden, for example, have positions as Chief Nursing Officer/Chief Nurse Executive in the highest organizational level, neither a clear structure nor a formal regulation for nursing leadership that runs from "top to bottom." Organizational culture and quality of leadership, have been linked to the ability to recruit and retain nurses in hospitals [6]. The results of this study underscore that RNs need to take actions to ensure that the profession gains mandates required to develop the organizational structures, where skills and education can thrive and are valued.

The academic progression and academic degrees in nursing, constituting a fundament in claiming professional status, are evidently linked to better patient outcomes and lower mortality [45, 46]. The results in this study indicate that, regardless of the development of nursing in Sweden during the past decades, originally initiated by the Swedish Higher Education Reform of 1977 [47] where nursing was integrated into regular university education, the parallel development in the employers' views might not have occurred. Nurses claim to fill the criteria of a profession [39], but other professions and organizational structures might not agree with this –which might be a somewhat overlooked cause when it comes to research on nurse turnover [7, 9, 16]. The results in this study suggest that it is important that the profession shoulder the ongoing process to address the need for structural change in both academia and healthcare. This is needed to ensure that RNs not only see possibilities of a professional career in healthcare but are also allowed and expected to practice nursing at its highest standards. A healthcare organization, which allows nurses to provide safe and person-centered care in a structure, where RNs are expected to lead the profession in well-functioning interprofessional collaborations on all levels, likely increases the chances of both recruiting and retaining nurses for the long term.

5. Methodological Considerations

The interviews in this study were conducted during the early outbreaks of the COVID-19 pandemic. This might have had an impact on the possibility of recruiting informants due to the overall, extreme burden in healthcare at the time.

Nevertheless, the informants in this study focused on a work situation that made them quit their jobs, which took place before the pandemic. Therefore, we believe that the results are not impacted by the extraordinary situation during the pandemic. Moreover, there is a potential for recall bias given the two-year gap between the termination of employment and the interviews. However, this time lapse might have allowed the informants to share experiences that were more reflective and less influenced by immediate and intense emotions surrounding the decision to quit. Nevertheless, despite this temporal delay, the interviews were characterized by richness and detail.

A facilitating factor in recruitment was that interviews were conducted online through phone or digital meetings. Both men and women participated in the study; however, as expected, due to the gender distribution in nursing in general, there were fewer men than women. The authors, therefore, chose not to specify the exact numbers to protect the integrity of the informants. Trustworthiness was achieved by carefully describing the context, and by a transparent and reflective communication between the authors in the whole process. This study was carried out by three women, all registered nurses. All worked as senior lecturers, and two also worked part-time with nursing quality development projects in hospitals. The authors have broad experience of conducting research interviews, and from the qualitative analysis method applied in this study. Transferability to other settings seems possible, but it is up to the reader to decide [48]. The authors had no previous relationship with the informants, and the study followed the Standards for Reporting Qualitative Research (SRQR) [49].

6. Conclusion

The RNs in this study expressed various reasons leading them to the decision to quit their jobs. These experiences ranged from overwhelming feelings of lacking the practical and organizational prerequisites to practice nursing at a professional standard, to severe understaffing together with insufficient scheduling and low salaries. Additionally, the RNs expressed the feelings of being valued and treated as a subordinate profession, not being expected to have the same expectations on professional autonomy and career possibilities as other professions. The RNs experienced that the, overall, insufficient work conditions, including an experienced lack of patient safety in several dimensions, ultimately pushed them to quit their jobs. Hence, RNs expressed a wish and expectation to practice their profession according to professional standards, and to be treated like a self-governing profession in the team and organization – but ultimately, they realized they were only seen by the employer as a replaceable brick in the game.

6.1. Implications for Nursing Management. The findings underscore the vital necessity for nursing management to develop overall working conditions and a leadership structure for RNs to ensure that the profession feels valued according to the professional standards and requirements

for autonomous practice. Nursing management and leadership need to be adjusted to meet the expected demands of a modern academic profession and move away from a potential collective view of RNs. To reduce nurse turnover and, instead, attract and retain RNs, the organizations ought to encompass a view on RNs as individual professionals, who are expecting the same treatment and career options as traditional academically trained professions. Nevertheless, it is equally important to underscore that the pervasive changes required to alter the perception of nursing as a profession cannot be accomplished solely by individual nurses or nurse managers, regardless of their level. Such changes also need to be promoted and implemented at the political and societal level, both locally and internationally. Since the challenges of retaining nurses are not confined to local or national contexts but are observed internationally, it is crucial to consider the specific situation in each country, which may influence how these issues should be addressed.

Data Availability

The interview data used in this study are available in the Swedish language upon reasonable request from the first author.

Ethical Approval

Ethical approval was obtained from the Regional Ethical Review Board (Reg. no. 2016/111).

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Research Article

Identifying Accessibility and Equity Defects of Elderly Care Services in Developing Countries: Insights From Xiamen City

Linjiang Wei ^{1,2,3}, Ya Fang ^{1,2,3} and Liangwen Zhang ^{1,2,3}

¹State Key Laboratory of Molecular Vaccinology and Molecular Diagnostics, School of Public Health, Xiamen University, Xiamen, China

²Key Laboratory of Health Technology Assessment of Fujian Province, School of Public Health, Xiamen University, Xiamen, China

³State Key Laboratory of Vaccines for Infectious Diseases, Xiang An Biomedicine Laboratory, Xiamen University, Xiamen, China

Correspondence should be addressed to Ya Fang; fangya@xmu.edu.cn and Liangwen Zhang; lwzhang@xmu.edu.cn

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Background: The global aging population has raised concerns about the fair distribution of elderly care resources. China, as the largest developing country, has made efforts to address population aging challenges. However, equitable distribution of elderly care resources remains a concern. This study analyzed the spatial layout and accessibility of elderly care service facilities (ECSFs) in Xiamen City to improve resource allocation and enhance the elderly care system in China. The findings provide valuable insights for other developing countries and regions seeking to improve their own elderly care resource allocation.

Methods: Xiamen City was chosen as the research area due to its unique geographical location and advanced information technology infrastructure. The study examined the spatial distribution, accessibility, and equity of ECSFs. Using Python, point of interest (POI) data were collected and evaluated using the kernel density method and two-step floating catchment area method. Spatial autocorrelation analysis identified areas of aggregation and dispersion in ECSF accessibility.

Results: Xiamen currently has 660 ECSFs, including nursing homes, adult day care centers, home care agencies, and rural elderly care homes. The analysis revealed spatial disparities, with ECSFs clustering primarily in the central area of Xiamen Island. Significant differences in accessibility were found among the four types of ECSFs. Spatial autocorrelation analysis identified cold and hot spot areas, indicating variations in accessibility across regions.

Conclusion: Xiamen City has made progress in allocating elderly care resources and constructing service facilities. However, equity in resource allocation remains a concern. Areas with limited accessibility were identified, leading to unequal access to elderly care resources and timely physical care. To address these challenges, decision-making departments should consider increasing facilities, improving transportation, enhancing macro planning, and improving facility service quality and accessibility. These measures will optimize ECSF accessibility and promote equitable distribution of elderly care resources.

Keywords: elderly care service facilities; health equity; nursing; older adults; spatial accessibility

1. Introduction

In recent years, the global aging process has continued to deepen [1], especially after the outbreak of the COVID-19 pandemic, where the elderly population became a key focus of care due to their weakened immune systems [2]. As the country with the largest aging population in the developing world, the demand for medical care, rehabilitation, and

elderly care resources for the elderly in China continues to increase [3, 4]. Informal care is facing challenges such as inadequate care manpower and low care quality, while formal care has begun to receive special attention. Under tremendous pressure, the government has made many attempts and introduced a series of positive policies [5, 6], which has led to the golden period of elderly care service system construction [7]. The elderly care industry has

flourished, the types and numbers of elderly care service facilities (ECSFs) have started to surge, and market-oriented elderly care methods such as home care, institutional elderly care, and community elderly care have emerged one after another. However, it is worth noting that some studies have shown that there are still problems with the equity of elderly care resource allocation in China [8]. There is an obvious supply–demand mismatch, and even some existing facilities in developed regions do not meet the fair and reasonable planning requirements [9–12].

Due to the decline in physical functioning, the elderly population has reduced adaptive capacity to the environment and is more susceptible to the influence of external environmental factors [13–16]. Therefore, for elderly individuals living in areas with fair allocation of elderly resources and reasonable spatial distribution of ECSFs, it is easier for them to access the necessary elderly resources and receive timely physical care at ECSFs. This enables them to meet their basic life needs at a lower transportation cost, ensuring their physical and mental well-being and enhancing their quality of life [17].

Accessibility assessment is a key indicator for measuring the equity and rationality of spatial distribution [18–20], and it has been widely applied in evaluating the layout of public service facilities such as education, healthcare, parks, and green spaces [20]. It can reflect the ease or difficulty for the elderly population in accessing elderly care services.

Currently, there are many methods used by scholars for accessibility assessment in the field of elderly resource allocation, and the corresponding indicators are also diverse [21]. However, they mainly involve two analytical approaches: accessibility assessment based on opportunity accumulation and accessibility assessment based on spatial interaction. Accessibility assessment based on opportunity accumulation focuses on quantifying the amount of resources that facility points or residential points can access within a certain time threshold. Spatial interaction models are geographic methods derived from Newton's universal law of gravitation. Their advantage lies in their ability to utilize relevant data to elucidate the interaction between supply and demand of elderly resources and to analyze the impact of geographical accessibility on individual behavior while evaluating individual spatial accessibility. In summary, the accessibility assessment methods based on opportunity accumulation consider multiple factors such as transportation networks, distribution of service facilities, and population density. They delve deeper into the cumulative effects of resources and the consideration of temporal factors. However, the application of such spatial analysis methods in the field of elderly resource allocation is still relatively limited.

From the perspective of research content, there are still some limitations in the current studies on accessibility assessment of elderly resources. First, the research scale is not sufficiently refined. Existing studies often treat a city or a specific urban area as a whole, without delving into the specific accessibility of each residential cluster. This overlooks individual travel time and living range, which may lead to research conclusions that do not align with reality [22].

Second, the research areas mainly focus on the core urban areas or specific regions of a city, with fewer comprehensive assessments of accessibility across the entire city, neglecting to address the disparities between rural and urban areas. Furthermore, there are various types of ECSFs, but most studies do not classify them or only focus on the accessibility of a specific type of facility [23]. Lastly, existing research data often come from government official statistical yearbooks, which may lack detailed information and may not be promptly updated [24].

In summary, while the elderly care industry in China has been rapidly developing, it has also revealed issues such as unfair resource allocation and mismatched supply and demand. Faced with the dilemma of elderly individuals being unable to access care services equitably, there are currently some deficiencies in the methods and content of evaluating the accessibility of elderly care resources. Therefore, this study establishes the following research logic and objectives: First, by employing Python programming language, a web crawler program was developed to obtain the latest point of interest (POI) data on ECSFs in Xiamen City. These data include information such as name, category, coordinates, and classification. Second, using kernel density estimation, two-step floating catchment area (2SFCA) method, and spatial autocorrelation analysis, a comprehensive evaluation was conducted on the spatial accessibility and equity of various types of ECSFs in Xiamen, including nursing homes (NHs), adult day care centers (ADCs), rural health clinics (RHCs), and home care agencies (HCAs) (see Figure 1 for details).

The aim is to identify potential issues in the allocation of elderly care resources in Xiamen, expand the theoretical knowledge to address resource allocation problems, provide a basis for scientifically formulating resource allocation plans, rationalize the layout of elderly care service planning, enhance the quality of care for the elderly population, and improve the overall elderly care service system. Moreover, this study aims to provide valuable insights that can be applied to other cities in China as well as various developing countries and regions.

2. Methods

2.1. Research Site. Xiamen is located in the southeast of Fujian Province in East China (the specific location of Xiamen City can be seen in Figure 2, and the satellite image is shown in Figure 3(a)). As of 2021, Xiamen has six districts, including Siming, Huli, Jimei, Haicang, Tong'an, and Xiang'an, with 37 streets and eight towns (as shown in Figures 3(b) and 3(c)). The total area is 1700.61 square kilometers, with a permanent population of 5.28 million [25]. The total length of roads in the city (excluding natural village roads) is 2223.13 km, including 259.17 km of national roads, 240.4 km of provincial roads, 394.9 km of county roads, 657.4 km of township roads, and 671.27 km of village roads (as shown in Figure 3(d)).

As a developed city on the southeastern coast of China, Xiamen has a high level of economic development, a strong foundation for elderly care services, well-developed

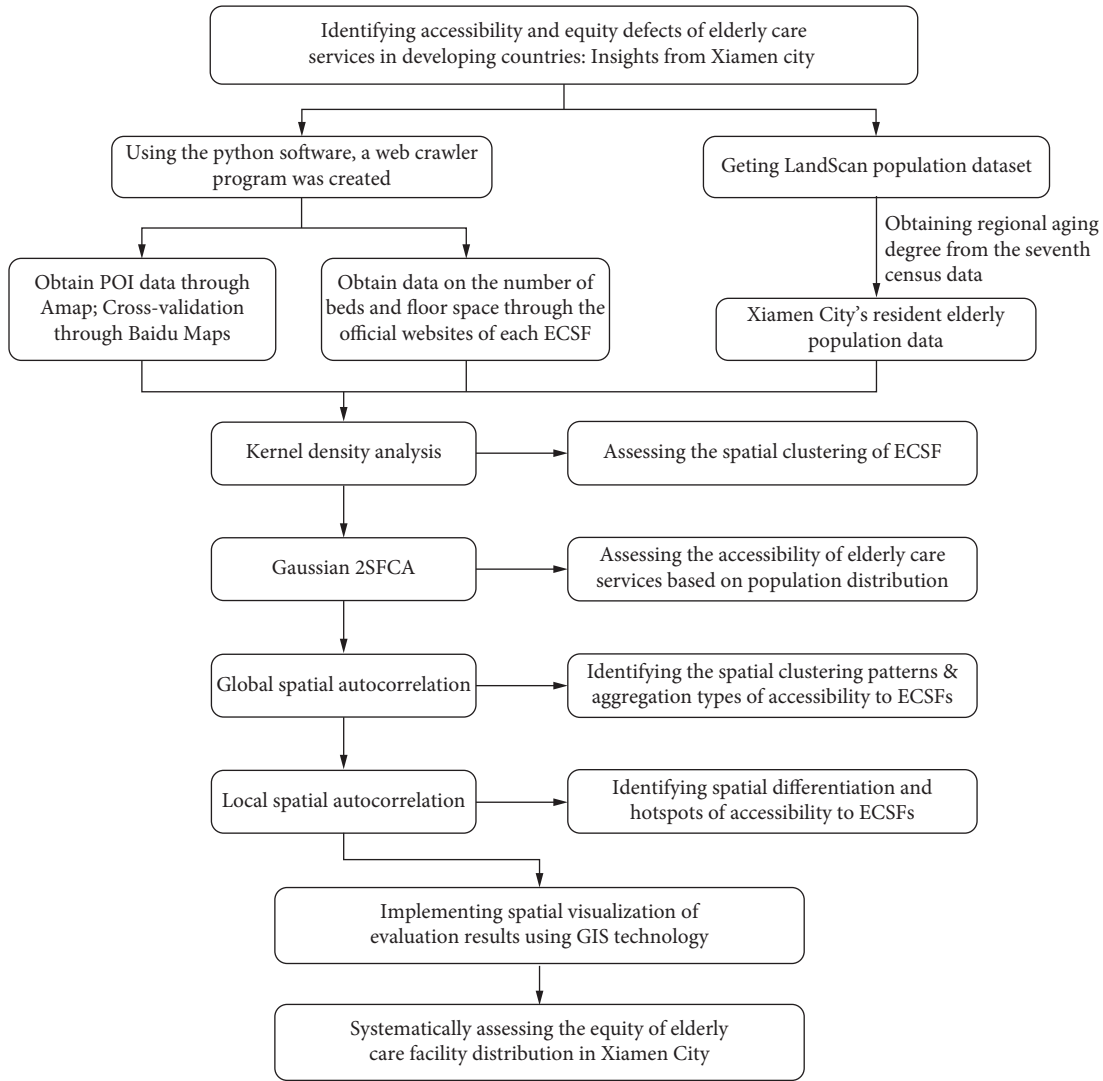


FIGURE 1: Research framework.



FIGURE 2: Research site.

information technology infrastructure, transparent access to various types of information, and easy accessibility. The city has set goals for future elderly care service system development: By 2025, a batch of urban convenient living circles with complete functions, smart and convenient services, and high-quality service and living harmony will be built, in accordance with the requirements of a “15-min living circle,”

to reduce the difficulty in obtaining elderly care services. At the same time, the city continues to focus on the equity of elderly care service access and aims to establish a sound elderly care service system based on home care, supported by the community, supplemented by institutions, and integrating medical and elderly care by 2035. This will expand elderly care services from specific populations to the general

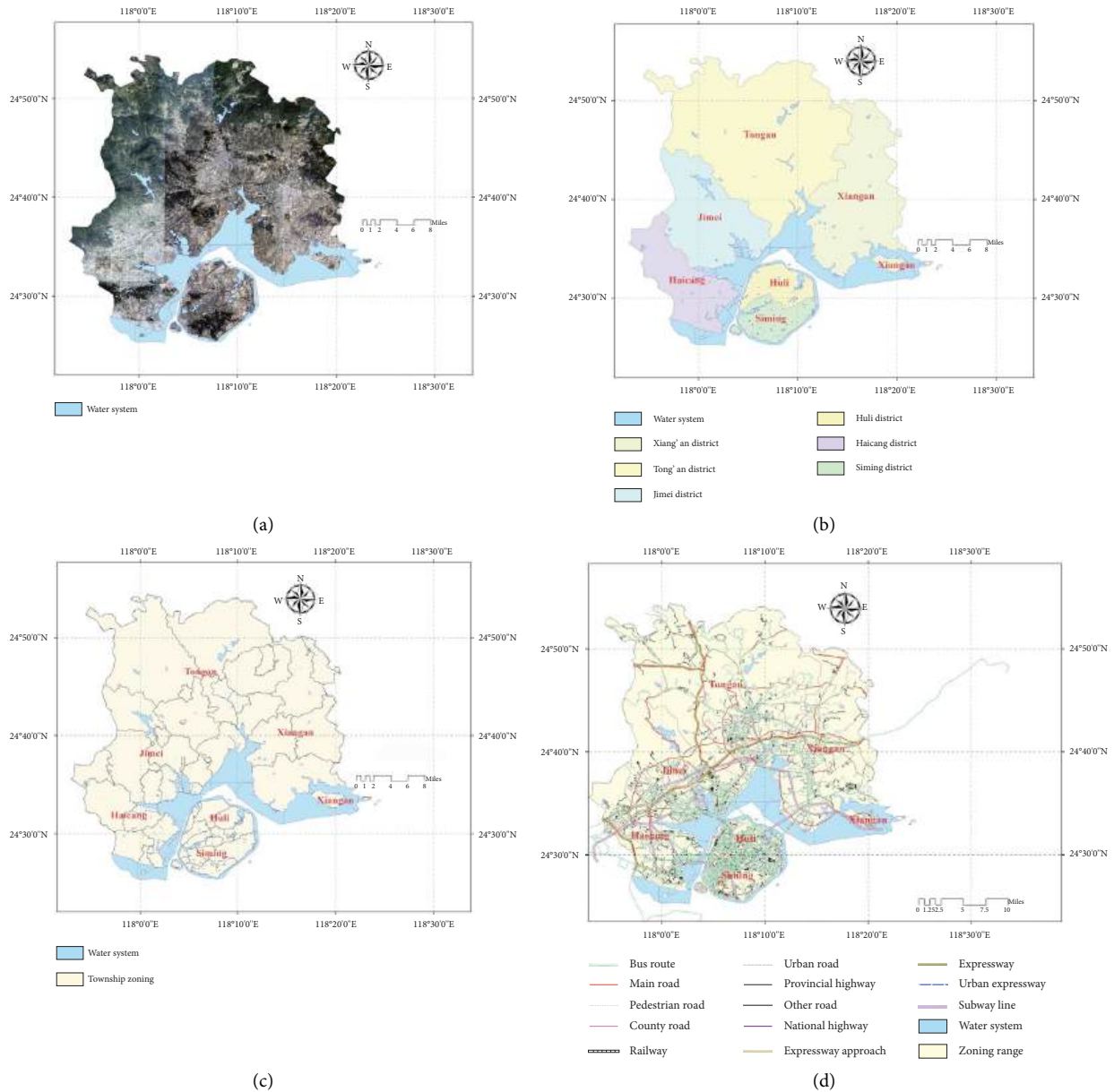


FIGURE 3: (a) The Xiamen satellite map, (b) the extent of administrative divisions in Xiamen, (c) the extent of street and township divisions in Xiamen, and (d) road traffic in Xiamen.

public, transform social welfare from “deficiency compensation” to “universal coverage,” and ultimately achieve a minimum of 40 senior care beds per thousand elderly people and a per capita land area for ECSFs of no less than 0.1 square meters in urban and rural areas [26]. As the global aging population increases, economic development and national economic strength continue to improve in China and other developing countries, and more and more cities will follow a development trajectory similar to Xiamen. Therefore, Xiamen City was selected as the research area for this study to clarify the equity of ECSF construction in developed Chinese cities and to provide experience and reference for other developing countries and regions.

2.2. Data Acquisition. According to the 15-min living circle construction criteria and the spatial layout planning of ECSFs in Xiamen City, this study classified the ECSFs into four categories: A (NHs that provide long-term centralized nursing services, with a service radius of 10–15 km), B (ADCs that provide day care services, with a service radius of 1–1.5 km), C (REHs that mainly serve rural residents, providing comprehensive elderly care services based on home care and community support, with a service radius of about 1 km), and D (HCAs that mainly serve urban residents, providing home-based services within 1 km). The specific service radius was determined based on the number of beds in each facility.

To conduct a scientific evaluation of the layout of ECSFs, it is necessary to analyze and study them in the context of geographic space. Traditional methods of data acquisition often rely on sources such as statistical yearbooks and registration data from civil affairs bureaus, utilizing methods such as surveys and door-to-door inquiries. However, these approaches are time-consuming and labor-intensive and may face challenges in obtaining data due to issues such as permissions. While secondary statistics from government or health departments may have higher reliability, they often lack detailed information on individual medical institutions due to access restrictions. Moreover, official secondary data are typically updated only once a year or even less frequently, leading to potential data lag. In the current context of various medical vertical portals and Internet mapping service providers, Internet data offer advantages such as large volume, timeliness, and low acquisition costs. Therefore, this study starts with Internet data and utilizes Python web scraping techniques and Internet open platforms to collect data related to elderly care facilities and the associated assessments.

Among the collected data, the information on elderly care facilities and road traffic POIs was collected in March 2023. The data on population aggregation points were collected at the end of 2021, and the estimation of the elderly population in each administrative region was based on the results of the seventh national population census of China.

The POI web crawler software used in this study was developed using Python 3.10. The road traffic data were sourced from Amap (<https://ditu.amap.com/>) and Baidu Maps (<https://map.baidu.com/>). The data on elderly care institutions were collected from the Xiamen Municipal Government's Convenience Platform (<https://www.ixiamen.org.cn/>) and various official websites of the care institutions, such as Xiangyu nursing home (<https://xiangyuciai.com/>) and HA nursing home (<https://www.hanursing.com/>). Python 3.10 was employed for statistical analysis, while ArcGIS 8.0 software was utilized for creating the statistical maps.

2.2.1. ECSF. This study utilizes the Amap Developer Platform and its Web development service module to search for POIs by developing a Python web crawler script. The script is designed to match the specified data request format in order to obtain POI data for elderly care institutions with geospatial information, including names, categories, coordinates, and classifications. To validate the results, cross-validation is performed using POI data obtained from Baidu Maps.

After the statistical classification of POI data, the number of beds and floor area data were obtained by querying the official websites of various ECSFs. Table 1 shows an example of obtaining data.

2.2.2. Demographic. In existing research on the quantification of accessibility and equity of ECSFs, population data from regional statistical yearbooks are often used as the demand-side data. The statistical scale is mostly at the level of administrative regions or streets, which can lead to

homogenization of the calculation results. To obtain more realistic results in accessibility calculations, this study narrowed the statistical scale and used population data within a 1 km * 1 km range as the demand scale for accessibility evaluation.

The population spatial distribution grid data of Xiamen City are sourced from the 2021 LandScan population dataset by Oak Ridge National Laboratory (<https://landscan.ornl.gov/>). These data provide community-level population distribution data worldwide, with a spatial resolution of 1 km × 1 km, sourced from the total amount of environmental data over a period of time. In this study, we used these data in combination with the elderly proportion in each administrative region in the seventh national census report (see Table 2) to estimate the number of elderly people in the study area.

2.3. Statistical Methods. In this study, a series of spatial statistical methods were employed to assess the fairness of elderly care facility distribution in Xiamen City. Specifically, we utilized the following methods: First, kernel density analysis was used to illustrate the spatial clustering patterns of different types of elderly care facilities. However, this method only displays the density quantity of facilities in space and does not reflect the actual relationship between the elderly population and the availability of care resources. Therefore, in this study, we employed the Gaussian 2SFCA (Ga2SFCA) method to delve deeper into the accessibility of various types of care institutions. Moreover, we conducted global spatial autocorrelation analysis and local spatial autocorrelation analysis to identify the spatial heterogeneity of elderly care facility accessibility in Xiamen City and pinpoint specific cold and hot spot areas. This comprehensive evaluation allowed this study to provide a more thorough assessment of the elderly care facilities in Xiamen. Here is a brief introduction to the specific statistical methods employed.

2.3.1. Kernel Density Analysis. Kernel density estimation is a nonparametric method used for spatial analysis of point elements. It estimates the density variation of point distributions using a moving unit and reveals the clustering patterns of point elements on a spatial scale, thus reflecting the accessibility of elderly resources [27]. The formula for calculating kernel density is given by the following equation:

$$\lambda_s = \sum_{i=1}^n \frac{1}{\pi r^2} \varphi\left(\frac{d_{is}}{r}\right), \quad (1)$$

where λ_s represents the kernel density value at grid s , r denotes the search radius, n indicates the total number of POI points, d_{is} represents the distance between POI points, and φ represents the weight.

2.3.2. Ga2SFCA. The 2SFCA method, as a mainstream accessibility evaluation method, has received widespread attention from scholars and has been introduced into research on elderly care resource allocation [28]; it can

TABLE 1: Example of data acquisition results.

Field name	Result	Paraphrase
sOrgName	Huli Street (Haotou) Elderly Day Care Center	Institution name
sAddress	No. *, Hening 2nd Road (Building 1 and Building 4, Building 3, Jianfa Yibai Elderly Day Care Center)	Institution address
sTel	188****5816	Contact information
iRunStatus	1	1: in operation; 0: suspended operation
sQualification	Public and private	Institutional nature
iOrgType	2	Institution type: 1 (NH); 2 (ADC); 3 (HCA); 4 (REH)
iBedCount	22	Number of beds
dCoveredArea	1000	Floor area (m ²)
sLongitude	118.086046	Longitude
sLatitude	24.495159	Latitude

TABLE 2: The number of elderly population and the degree of aging in each district.

District	Elderly population	Degree of aging (%)
Siming	1,50,577	14.87
Huli	75,047	7.24
Haicang	46,362	7.96
Jimei	69,145	6.67
Tong'an	80,502	9.40
Xiang'an	62,946	10.90

Note: The data are sourced from the 7th National Population Census of China.

comprehensively consider the capacity, distribution, type, distance, and travel mode of service facilities and is easy to be personalized designed.

The Ga2SFCA was proposed by Dai in 2010. He used a Gaussian function as the distance decay function $g(d_{ij})$ [29] within the 2SFCA search domain for the accessibility evaluation of medical facilities. The specific calculation method can be found in the following equation:

$$A_i = \sum_{j=1}^n \frac{S_j f(d_{ij})}{\sum_{k=1}^m D_k f(d_{kj})}, \quad (2)$$

where A_i represents the accessibility of demand point I to obtain pension services, d_{ij} represents the road network distance between supply point j and demand point I , d_{kj} represents the distance between supply point j and demand point k , and $D f(d_{ij})$ represents the distance decay function. It can also be further expressed as the following equation:

$$f(d_{ij}) = \begin{cases} g(d_{ij}), & d_{ij} \leq d_0 \\ 0, & d_{ij} > d_0 \end{cases}, \quad (3)$$

where $f(d_{ij})$ represents the distance decay function, d_{ij} represents the distance between the supply point j and the demand point i , d_0 represents the search range, and $g(d_{ij})$ represents the distance decay function within the search range d_0 . $g(d_{ij})$ is introduced as a modified calculation of the original 2SFCA method by introducing the decay function. In the original 2SFCA method, $g(d_{ij})$ is always a constant value of 1.

The proposed method differs from the original 2SFCA method in several aspects. First, this method enables a random exploration of the entire search space to seek the global optimum. In addition, it employs an adjustment of the search step length and direction, along with a sampling strategy using Gaussian distribution, to perform a more refined search in the neighborhood, aiming to find solutions that are closer to the local optimum. Second, it effectively deals with uncertainties and noise within the search space by employing an adaptive adjustment of the search step length and direction, as well as a sampling strategy using Gaussian distribution. This robustness enhances the reliability and stability of the algorithm when dealing with complex problems in the real world. Lastly, the Gaussian distance decay function exhibits an increasing decay rate with distance, initially accelerating and then decelerating. This pattern is analogous to people's expectations in real-life decision-making processes regarding the selection of

elderly care facilities. Therefore, it can simulate real decision-making states more realistically [30].

The calculation expression is as follows:

$$g(d_{ij}) = \frac{e^{-(1/2)} \times (d_{ij}/d_0)^2 - e^{-(1/2)}}{1 - e^{-(1/2)}}, \quad d_{ij} \leq d_0. \quad (4)$$

2.3.3. Spatial Autocorrelation. Spatial autocorrelation is commonly used to explore the presence of statistical correlation between data or variables in space or to investigate the potential mutual influence among several indicators. The research theory inherits from the first law of geography proposed by the Swiss geographer Waldo Tobler, i.e., everything is related to everything else, but near things are more related than distant things [31]. Spatial autocorrelation can reveal the distribution and pattern characteristics of data in space, such as exploring the aggregation and dispersion of data and identifying the hot and cold spots of data distribution. Therefore, it is often used to study the distribution of related indicators of public service facilities. In this study, the Global Moran's I and Getis-Ord General G indices were used to analyze the spatial distribution characteristics of the accessibility of ECSFs, and the Local Indicator of Spatial Autocorrelation (LISA) and Getis-Ord G_i^* tool were used to identify the areas of aggregation and dispersion of data.

2.3.3.1. Global Spatial Autocorrelation. Global Moran's I reflects the overall spatial autocorrelation of the study area and is used to determine whether there is spatial autocorrelation in the research object as a whole. It is a spatial autocorrelation statistic for the entire study area. The Getis-Ord General G method is used to preliminarily determine the clustering type.

The Global Moran's I method of global spatial autocorrelation is given in the following equation:

$$I = \frac{n}{S_0} \times \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} (y_i - \bar{y})(y_j - \bar{y})}{\sum_{i=1}^n (y_i - \bar{y})^2}, \quad S_0 = \sum_{i=1}^n \sum_{j=1}^n w_{ij}. \quad (5)$$

The Getis-Ord General G method of global spatial autocorrelation is given in the following equation:

$$G = \frac{\sum_{i=1}^n \sum_{j=1}^n W_{i,j} x_i x_j}{\sum_{i=1}^n \sum_{j=1}^n x_i x_j}, \quad j \neq i, \quad (6)$$

where $y_{i(j)}$ represents the accessibility calculation value obtained from residential area i (j) in this study; y represents the mean value of all research area data, which is the mean accessibility value of all residential areas in this study; n represents the number of residential areas; and W represents the spatial weight matrix [32].

2.3.3.2. Local Spatial Autocorrelation. Global spatial autocorrelation statistics indicate the presence of clustering, while local spatial autocorrelation indicates the location and type of spatial association. To further study the distribution pattern of the spatial accessibility scores of ECSFs, this study used the LISA analysis method to identify local clusters of accessibility. Due to the heterogeneity of space, there may be different aggregation states in different geographical locations. LISA [33] is suitable for studying the heterogeneity characteristics of the clustering of ECSF accessibility. It calculates local indicators for each observation in the dataset and identifies four types of spatial association: (a) high–high (HH): locations with high attribute values surrounded by other locations with high attribute values. This indicates spatial clusters of similar values; (b) low–low (LL): locations with low attribute values surrounded by other locations with low attribute values. This also indicates spatial clusters of similar values; (c) high–low (HL): locations with high attribute values surrounded by other locations with low attribute values. This indicates spatial outliers or anomalies; and (d) low–high (LH): locations with low attribute values surrounded by other locations with high attribute values. This also indicates spatial outliers or anomalies.

The Getis–Ord G_i^* tool is suitable for hot spot analysis and can analyze the distribution of cold and hot spots of accessibility. The interpretation of the results is as follows: (a) positive G_i^* values: locations with positive G_i^* scores have high attribute values and are surrounded by other locations with high attribute values. This indicates statistically significant hot spots or areas of high clustering; (b) negative G_i^* values: locations with negative G_i^* scores have low attribute values and are surrounded by other locations with low attribute values. This indicates statistically significant cold spots or areas of low clustering; and (c) Z-scores close to zero: locations with Z-scores close to zero have attribute values similar to their neighbors, indicating no significant spatial clustering or dispersion.

The calculation expression is as follows.

The LISA method of local spatial autocorrelation is given in the following equation:

$$I_i = \frac{n(x_i - \bar{x})\sum_{i=1}^n \sum_{j=1}^n w_{i,j}(x_i - \bar{x})}{\sum_{i=1}^n (x_i - \bar{x})^2} \quad (7)$$

The Getis–Ord G_i^* method of local spatial autocorrelation is given in the following equation:

$$G_i^* = \frac{\sum_{j=1}^n W_{i,j}x_j - \bar{X}\sum_{j=1}^n w_{i,j}}{S\sqrt{\left[\left(n\sum_{j=1}^n w_i^2 - \left(\sum_{j=1}^n W_{i,j}\right)^2\right)/n - 1\right]}} \quad (8)$$

where x_i and x_j are attribute values for features i and j ; $w_{i,j}$ is the spatial weight between feature i and feature j ; and n is the number of features in the dataset. When the G_i^* statistic is higher than the mathematical expectation and passes the hypothesis test, it is a hot spot; otherwise, it is a cold spot [32].

3. Results

3.1. Description. As of March 2023, there are 660 ECSFs in operation in Xiamen City, including 41 NHs and 44 ADCs, mainly located on Xiamen Island in the Huli and Siming districts. There are 441 HCAs, mainly distributed in population clusters on Xiamen Island and near the sea. There are also 134 REHs, mainly distributed in the Tong'an District. The specific distribution is shown in Figure 4(a). The Siming District has the highest concentration of elderly population, while the Xiang'an District has the lowest, and overall, the distribution shows radiation decay from the island to the outside, as shown in Figure 4(b).

3.2. Kernel Density Analysis. Kernel density analysis can show the spatial clustering of the distribution of ECSFs based on their quantity. The analysis results are shown in Figure 5, which reveals a serious clustering in the spatial distribution of various types of ECSFs in Xiamen City. NHs, which provide long-term care, are mainly concentrated in the Siming and Huli districts, with some clustering in the population clusters of Jimei and Tong'an, and lower clustering in other areas. ADCs, which mainly provide general care and companionship services, are mainly concentrated in the southwest of Xiamen Island. HCAs mainly provide on-site safety, daily living, and basic medical services to elderly people in surrounding communities, with main clusters in the Siming and Huli districts on Xiamen Island, but with the broadest coverage among all ECSFs. REHs mainly serve rural elderly people and provide comprehensive day care services such as daytime rest and leisure activities. They are mainly located outside Xiamen Island, with main clusters in the Tong'an and Jimei districts and few distributions on Xiamen Island.

According to the results of the kernel density analysis, the spatial distribution of existing ECSFs in Xiamen City is uneven, with most of them showing a clustering state centered on Xiamen Island. However, as kernel density analysis can only display the density quantity of various facilities in space, it cannot reflect the true relationship between the elderly population and the availability of elderly care resources. Therefore, it is necessary to use the Ga2SFCA method to further explore the accessibility of various ECSFs.

3.3. Accessibility Analysis. In order to fully consider the factor of aging population and further measure its true relationship with the availability of elderly care resources, this study used the Gaussian two-step mobile search method to evaluate the accessibility of ECSFs in Xiamen City.

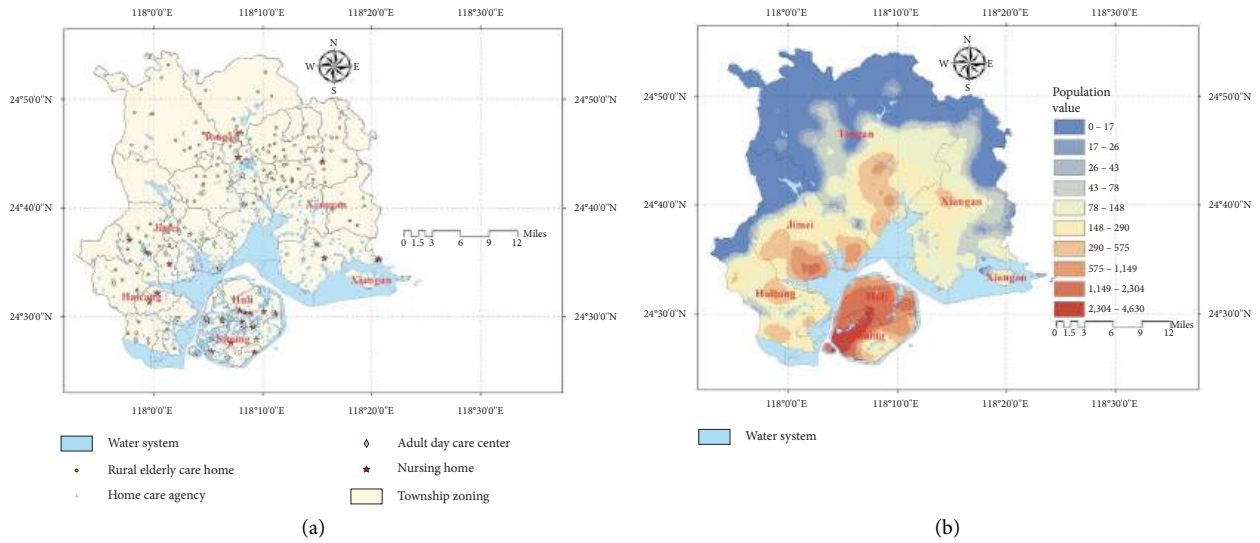


FIGURE 4: (a) The distribution of 660 ECSFs and (b) the distribution of the elderly population in Xiamen.

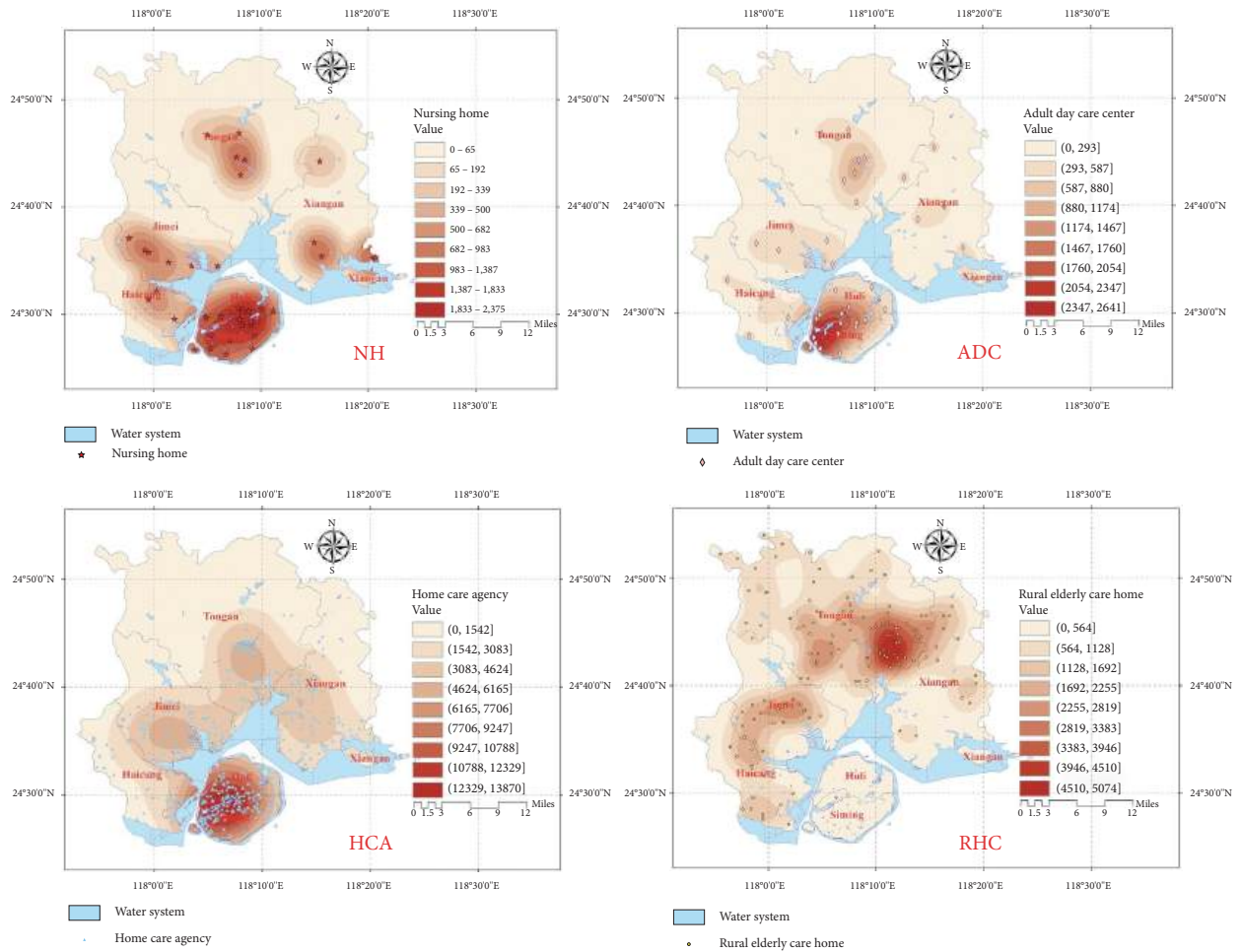


FIGURE 5: Result of kernel density analysis of ECSFs.

Considering that Xiamen Island (Siming and Huli districts) and the surrounding areas (Haicang, Jimei, Tong'an, and Xiang'an districts) are separated by sea, this study set up

path barriers around Xiamen Island. The detailed accessibility distribution results of ECSFs in Xiamen City were obtained and processed by Kriging interpolation, as shown

in Figure 6. The high accessibility areas of NHs are mainly located in the midlatitude areas of Xiamen Island and Haicang District, while the low accessibility areas are mainly located in the northeast and northwest of Xiamen City. The high accessibility areas of ADCs are mainly located in the northwest, while the low accessibility areas are mainly located in the eastern areas. The low-value areas are mainly located on Xiamen Island, where HCAs are mainly clustered. The high-value areas of REHs are mainly located at the boundaries of Jimei, Tong'an, and Xiang'an districts, while the low-value areas are mainly located in the population clusters in the south of Xiamen Island and Tong'an District.

3.4. Global Spatial Autocorrelation. From the analysis of global spatial autocorrelation, it can be seen that the accessibility of the four types of ECSFs all show a significant clustering distribution state in space, with the REH showing the strongest positive correlation (Moran's $I=0.777853$; observed General $G=0.005048$) and the ADC showing the lowest positive correlation (Moran's $I=0.299089$; observed General $G=0.009919$). Details can be found in Table 3.

3.5. Local Spatial Autocorrelation Analysis. Based on the analysis of global spatial autocorrelation, this study used local spatial autocorrelation analysis to identify specific discrete and clustered areas in space. The results are as follows. The LISA map shows that the high-high clustering area of NHs in Xiamen City mainly appears in the central part of Xiamen Island and Haicang District, while the low-low clustering area is densely distributed in the midlatitude areas of Xiamen City. The high-high clustering area of elder care centers appears in Xiang'an and Tong'an districts, with large surrounding areas of low-high clustering. The high-high clustering area of HCAs mainly appears in the southern part of Haicang, Jimei, and Xiang'an districts, and there are widespread low-low clustering areas in the northern part of Xiamen City. The high-high clustering area of REHs mainly appears in the rural areas in the north of Xiamen City, and the low-low clustering area mainly appears in the southern part of Xiamen City (as shown in Figure 7). Hot spot analysis shows that the hot spot areas of NHs appear in Xiamen Island and Haicang District, and the east-west boundary of the midlatitude area in the city shows a cold spot distribution. The hot spot area of ADCs only appears in a small part of the central area of the Tong'an District. The hot spot areas of HCA mainly appear in the western part of Haicang District, Jimei District, and the central and eastern parts of Xiang'an District, while the cold spot areas mainly exist in the rural areas in the north of Xiamen City. The main hot spot area of REH appears in the boundary areas of the middle and northern parts of Xiamen City (Figure 8).

4. Discussion

As of March 2023, under the strong promotion of the country and the reasonable planning of the Xiamen municipal government, a series of achievements have been

made in the construction of ECSFs in Xiamen. However, there are still gaps in the equity of elderly care resource utilization in achieving the goal of a 15-min living circle and the 2035 vision, and urgent efforts are needed to address this issue.

4.1. Distribution Patterns and Causes of ECSF in Xiamen City.

Overall, the existing ECSFs in Xiamen demonstrate an imbalanced spatial distribution, with a higher concentration on Xiamen Island and fewer facilities in the surrounding areas. This pattern is characterized by the dominance of facilities on Xiamen Island and multiple core clusters in the areas outside the island. Specifically, NHs are primarily located in more prosperous areas, resulting in limited access to convenient long-term care for the elderly in most rural areas in the north of the city. This also poses challenges for family visits. The number of ADCs is insufficient, mainly concentrated in the Siming District, limiting the range of beneficiaries. HCAs primarily provide home-based security, daily living assistance, and basic medical care services to the elderly in surrounding communities. They are mainly concentrated in the Siming District and Huli District on Xiamen Island, with the widest coverage among all elderly care facilities. REHs primarily cater to rural elderly individuals, offering comprehensive daytime care services such as rest and recreational activities. They are mainly located outside Xiamen Island, with major clusters in the Tong'an District and Jimei District. They are less prevalent within Xiamen Island. Considering their similar functions to HCAs but with different target populations, their distribution is relatively reasonable.

There may be multiple factors contributing to this phenomenon. First, in terms of natural factors, the main topography of the Xiamen region consists of medium-low mountains, hills, plateaus, and coastal plains, generally exhibiting a northwest high to southeast low trend. The northwestern part of the area is characterized by mountains, hills, and hilly terrains, while the central-eastern part consists of plateaus and coastal plains [34]. The southeastern part comprises shallow tidal flats and artificially built-up plains. This leads to a preference for locating ECSFs in the southeastern part, making it difficult to establish clusters in the western regions. Second, in terms of historical factors, prior to the reform and opening-up, the main developed area of Xiamen was located on Xiamen Island. After the reform and opening-up, the urban area gradually expanded from the island toward the northern inland regions [35]. However, the distribution of ECSFs is deeply influenced by the urban development zones in Xiamen. The island area was developed earlier, with relatively complete supporting facilities, while the areas outside the island have a shorter development history, and both the coverage and construction density are in need of improvement. Third, in terms of economic development factors [36], Siming District and Huli District, located on Xiamen Island, are among the first batch of economic special zones in China and have a higher level of economic development. They are more likely to have a concentration of high-level public service

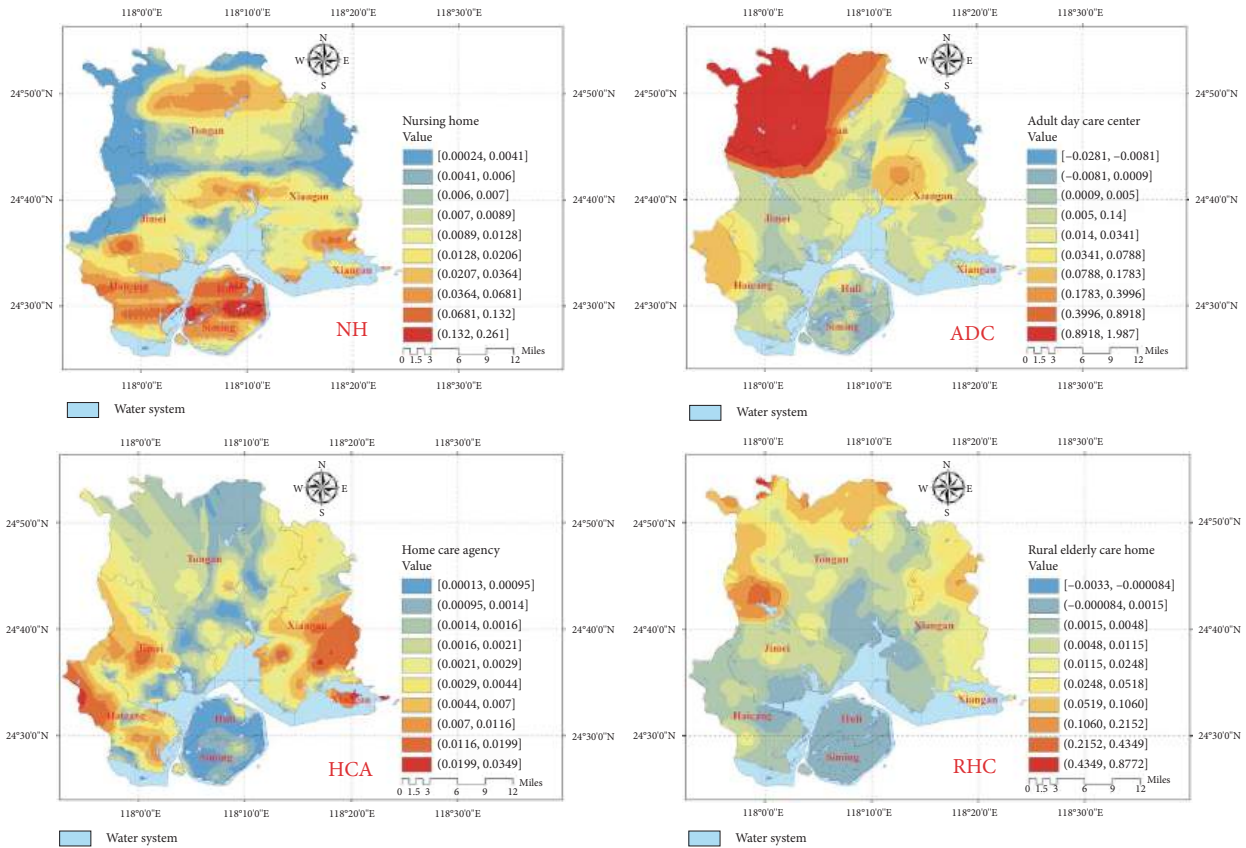


FIGURE 6: Accessibility analysis results of ECSFs.

TABLE 3: Global autocorrelation analysis results.

ECSF	Moran's I	Z-score	p value	Observed general G	Z-score	p value
NH	0.34611	45.32629	< 0.00001	0.001312	50.4855	< 0.00001
ADC	0.299089	16.7353	< 0.00001	0.009919	12.25809	< 0.00001
HCA	0.362659	27.20153	< 0.00001	0.001932	48.85721	< 0.00001
REH	0.777853	39.9211	< 0.00001	0.005048	53.02876	< 0.00001

facilities. The districts of Haicang, Jimei, Tong'an, and Xiang'an, located outside the island, have received focused planning in recent years, forming smaller scale clusters of ECSFs in their respective regional centers. However, in areas beyond these centers, the number of ECSFs is limited and their distribution is sparse. Lastly, while policy planning plays a guiding role in the rational allocation of ECSFs within the city, it can also influence the layout and equity of such facilities [36]. The supply of elderly care services comes from various sources, including the government, private capital, and social forces. These entities, driven by the pursuit of maximum benefits, make location choices for different types of ECSFs, leading to spatial disparities in the distribution of public service facilities [37]. For example, HCAs and REHs often involve government capital investment [38], resulting in more reasonable site selection that aligns well with their respective functions.

4.2. Existing Deficiencies and Potential Improvement Methods for the Accessibility of Various ECSFs. In terms of accessibility, the evaluation of NHs reveals that high-value areas are mainly located in Haicang District, Siming District, and Huli District, while large low-value areas are found in the peripheral rural areas in the northern part of Xiamen. Considering the government's recent efforts in developing the northern urban areas and the future direction of urban expansion toward the periphery, it is recommended that the government planning departments increase the construction of NHs in the peripheral areas. This would help increase the quantity and scale of facilities, contributing to a more rational allocation of public resources and greater equity in social services. If private enterprises refuse to establish NHs in rural areas, an alternative approach could be to develop corresponding NHs in suburban areas based on REHs. This would implement a "build first, optimize later" development

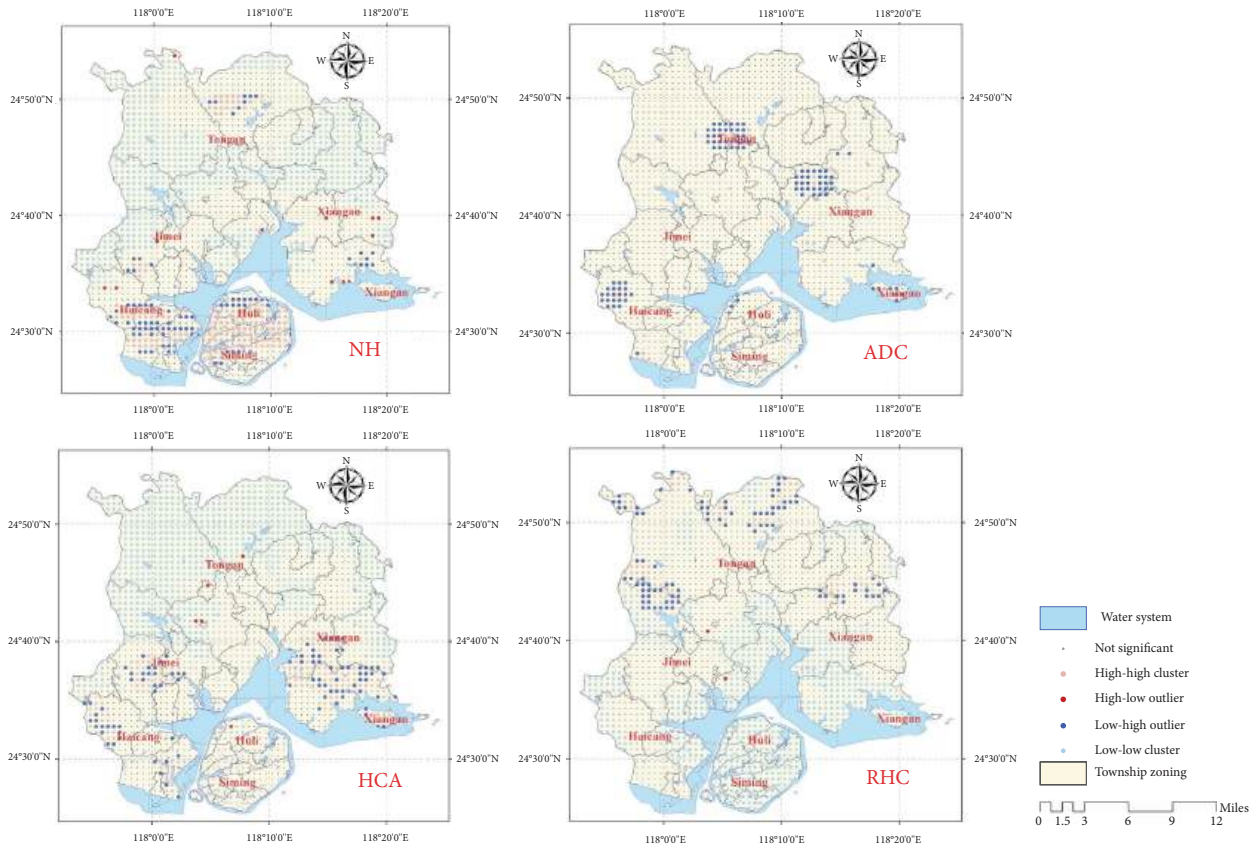


FIGURE 7: Clustering and outlier analysis results of various ECSFs.

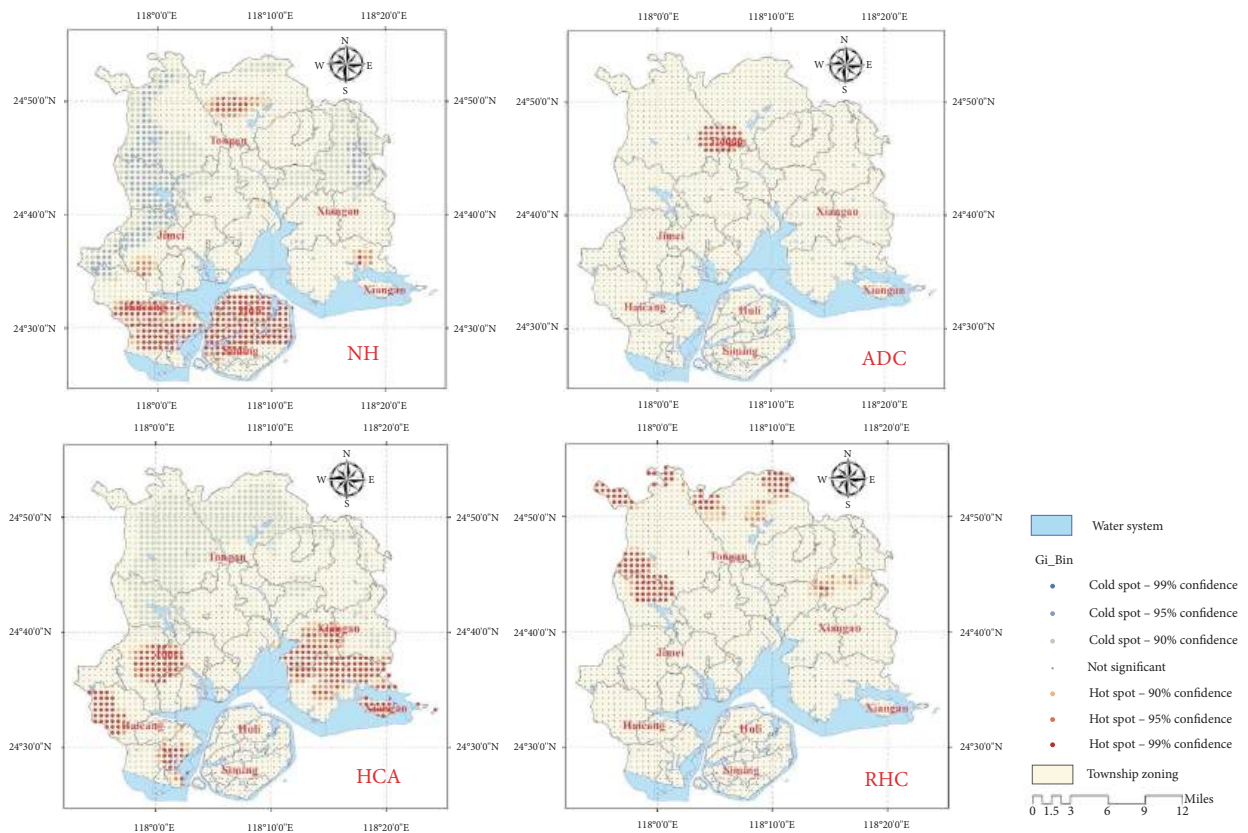


FIGURE 8: Analysis results of cold and hot spots of various ECSFs.

approach, gradually achieving full coverage of NHs in rural areas and providing convenient long-term care services for rural residents.

Previous studies have indicated that ADCs, as the most important ECSFs at the community level in the context of community-based aging, are widely recognized by many older adults. A study conducted in Sichuan Province showed that over 60% of community-dwelling older adults expressed their willingness to choose the elderly care model provided by ADCs. However, the current situation in Xiamen shows that the construction of ADCs is not well planned, and there are even areas with negative values in terms of accessibility evaluation. This suggests that the policy planning departments should focus on the construction of ADCs in the future, expanding their quantity and coverage, especially in the northeastern part of Xiamen.

It is worth noting that the main construction areas of HCAs are located in Siming District and Huli District, but the accessibility evaluation shows that this area is a low-value area. This indicates that a significant portion of urban elderly residents are unable to conveniently access elderly care services due to the concentration of population and the small service radius of HCAs. Considering the limited geographical area of Xiamen Island, we suggest that unused houses and land in densely populated areas be converted into ECSFs. This approach would not only reduce the waste of community resources but also increase the density of relevant HCAs. It would make it easier for mobility-impaired elderly individuals to access the necessary care services in their living environment. In addition, converting or building new facilities can help alleviate the financial burden on the government's elderly care funds [39].

Indeed, in comparison, REHs have shown excellent accessibility evaluation results, with high-value areas primarily located in rural areas. In the future, it would be beneficial to expand the scale of existing REHs, improve their medical equipment and staffing, and expand their service coverage area. This would help overcome the unequal distribution of elderly care resources caused by geographical barriers. By expanding the reach of REHs, more elderly individuals in rural areas can access the necessary care services, ensuring a more equitable distribution of elderly care resources.

Furthermore, the research results indicate significant spatial heterogeneity in the accessibility of various types of ECSFs, characterized by distinct hot spots and cold spots. Since accessibility evaluation is based on specific road network distances, the establishment of a "15-min living circle" standard emphasizes walking as the primary mode of transportation for the elderly. The development of transportation infrastructure will have a significant impact on the accessibility of ADCs, HCAs, and REHs for older adults [40]. Therefore, enhancing the road network infrastructure in the areas outside Xiamen Island, particularly in the northwest and northeast rural regions, through measures such as increasing the number of road branches and opening up intersecting roads [41], would contribute to improving the convenience of elderly individuals in accessing care services and enhancing their overall well-being.

5. Limitations

Despite using multiple methods to comprehensively evaluate the accessibility of ECSFs in Xiamen City in this study, there are still some limitations: The elderly population in each region in this study was predicted and may deviate from the actual situation, the service range of elderly care facilities was set based on a large number of previous studies and government documents, and the research results match the actual situation in Xiamen City and can reveal accessibility issues, but there may be more appropriate numerical settings. In the future, we plan to use more real data to evaluate the spatial distribution equity of elderly care facilities nationwide.

6. Conclusions

This study evaluated the accessibility of elderly care services in Xiamen City based on the ECSFs and road traffic POI data obtained through web crawling technology. The results of this study have important guiding significance for managers and decision-makers to formulate relevant policies and achieve fair allocation of elderly care resources. The main discoveries are as follows: Xiamen City, as an economically developed city in Southeast China, has achieved a series of achievements in the allocation of elderly care resources and the construction of service facilities under the strong advocacy of the country and the reasonable planning of the local government. However, there are still problems of poor equity.

In order to improve the fairness of elderly resource allocation, optimize the accessibility of elderly care facilities, and enhance residents' well-being, this study proposes several recommendations. First, increasing the number of elderly care facilities should be accompanied by a focus on service quality. Second, efforts should be made to strengthen the road network infrastructure in areas outside Xiamen Island, particularly in the northwest and northeast rural regions. Third, it is suggested that government capital should be involved as a provider in the planning and construction of elderly care facilities. This participation of public capital can help reduce the service costs of elderly care facilities and mitigate their concentration, thus covering a wider range of elderly individuals and improving the overall level of elderly care services in Xiamen. Lastly, expanding the scale of existing rural happiness homes, improving their medical equipment and staffing, and expanding their service coverage area would overcome the unfair distribution of elderly care resources caused by geographical barriers.

Data Availability Statement

The data for this study were obtained from publicly available government statistical yearbooks and public website POI data. The data used to support the findings of this study are available from the corresponding author upon request.

Ethics Statement

The POI data in this study are all from public platforms (Amap and Baidu Maps) and do not involve patient privacy, so ethical approval does not apply to this study.

Consent

The authors have nothing to report.

Disclosure

The funders had no role in study design, data collection, analysis, interpretation of results, or writing of the report. The authors had access to all the data and had full responsibility to submit for publication.

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

L.J.W. conceived the research questions, analyzed the data, and interpreted the results and was responsible for drafting the first draft of the paper. Y.F. coordinated the overall study design, participated in the interpretation of the results, and reviewed and revised the paper. L.W.Z. proposed the research questions, conducted the study design, and reviewed and revised the paper. Y.F. and L.W.Z. contributed equally to this work and should be considered as co-corresponding authors.

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Research Article

Impact of an Organizational Climate for Evidence-Based Practice on Evidence-Based Practice Behaviour among Nurses: Mediating Effects of Competence, Work Control, and Intention for Evidence-Based Practice Implementation

Miao Huo ¹, Haihong Qin ¹, Xiaohua Zhou ¹, Jinghua Li ²,
Bolun Zhao ³, and Ye Li ⁴

¹School of Nursing, Dalian University, Dalian, 116622, China

²School of Public Health, Jilin University, Changchun, 130021, China

³School of Nursing, Dalian Medical University, Dalian, 116044, China

⁴Emergency Department, Affiliated Zhongshan Hospital of Dalian University, Dalian, 116001, China

Correspondence should be addressed to Jinghua Li; jhli@jlu.edu.cn and Bolun Zhao; zhaobl@dmu.edu.cn

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Background. Despite the emphasis on the importance of implementing evidence-based practices, nurses did not adopt this approach as a standard. For those who have attempted to implement evidence-based practice in health care settings, the behaviour is rarely simple or straightforward. Therefore, exploring the mechanism that motivates nurses' evidence-based practice behaviour is essential to promote this practice. **Aims.** The aim of this study was to investigate the effect of the organizational climate for evidence-based practice on evidence-based practice behaviour among nurses through the mediating role of evidence-based practice competence, work control, and the intention to implement evidence-based practice. **Methods.** This study consisted of a cross-sectional design and convenience sampling to recruit 641 nurses employed in 6 hospitals in China. Five self-report instruments were used to collect the data. A structural equation model was adopted to verify the research hypotheses. IBM SPSS 26.0 and AMOS 24.0 were used for statistical analysis of the data. **Results.** The organizational climate for evidence-based practice was significantly and positively related to the nurses' evidence-based practice behaviour ($p < 0.01$). Direct effects accounted for 45.93% of the total effect. Evidence-based practice competence, work control, and the intention to implement evidence-based practice partially mediated the association between the organizational climate and evidence-based practice behaviour. The indirect effect accounted for 54.07% of the total effect. **Conclusion.** The organizational climate for evidence-based practice is critical for predicting and enhancing evidence-based practice behaviour. Evidence-based practice competence, work control, and the intention to implement evidence-based practice are intervening mechanisms that explain how the organizational climate promotes evidence-based practice behaviour. **Implications for Nursing Management.** Nursing managers should be aware of the interaction of individual and organizational factors that influence evidence-based practice behaviours among nurses. Administrators should improve the organizational climate by providing nurses with cultural and team support, mentoring, training projects, resource provisions, and more autonomy and authority at work, which are beneficial to the nurses' evidence-based practice competence, work control, and intentions to adopt evidence-based practices.

1. Introduction

Evidence-based practice is conceptualized as “clinical decision-making that considers the best available evidence, the context in which the care is delivered, client preference,

and the professional judgement of the health professional” [1]. The implementation of evidence-based practices can provide high-quality health care, reduce the incidence of complications, and decrease health care costs and resource use [2, 3]. However, putting evidence into practice seems

complex, and the implementation of evidence-based practice continues to remain low in most health care systems [4, 5]. A survey revealed that organizational climate has the greatest influence on the implementation of evidence-based practices [6], which is defined as “reflect employees’ overall assessment of their work environment” [7]. Considering that the behaviour is rarely simple or straightforward, Li et al. suggested that further research should focus on how organizational features influence implementation effectiveness [8]. The facilitation of evidence-based practice in nursing needs the organization and the individual levels [9]. Therefore, the main aim of this paper is to study the effects of the organizational climate on evidence-based practice behaviour through the mediating effect of individual factors among nurses.

For individuals, the intention to adopt evidence-based practices has been recognized as a strong precursor to subsequent utilization [10]. Consistent with the arguments in the literature, the factors that influence nurses’ willingness to engage in evidence-based practices are worthy of investigation. Evidence-based practice competence was emphasized as a significant predictor of implementation [11, 12]. Nurses also experience considerable challenges in implementing evidence-based practices due to a lack of confidence in critical appraisal skills and a low level of knowledge [13–15]. It has been demonstrated that the organizational climate, such as evidence-based practice mentoring, training, and supportive culture, is associated with competence and intention of evidence-based practices [16]. The precise mechanisms and extent to which the organizational climate influences evidence-based practice behaviours through competence and intention remain unclear. More investigations that combine these factors within a single study are needed so that we can better understand their relationships.

However, the implementation of evidence-based practices continues to remain low in China, even when nurses hold strong beliefs and knowledge about evidence-based practices [17]. One possible explanation for this inconsistency may be that individuals may possess knowledge and skills but struggle to apply them flexibly in a changing environment [18]. It has been argued that control practices can also influence evidence-based practices in a dynamic work environment [19, 20]. The perception of work control results from an interaction between the individual and the work environment [21], which is defined as “a composite of decision authority (e.g., freedom to make decisions) and skill discretion (e.g., opportunity to learn new things and develop new capabilities)” [22]. According to the literature review, nurses have a low sense of work control regarding evidence-based practice, including time constraints, work stress, inadequate resources and infrastructure, and a lack of authority and autonomy to make practice changes [10, 23, 24]. All of these factors are related to the organizational climate. The interactions among the organizational climate, work control, and the intention to engage in evidence-based practice have not been clearly explored. More investigations that combine these factors within a single study are needed so that we can better understand their relationships.

Most previous studies have focused on the impact of various factors on evidence-based practice behaviour among nurses [25], and the interactions among various factors relating to this practice have not been clearly explored. This study was based on SOR (stimuli-organism-response) theory. This theory suggests that when an individual encounters a particular stimulus (S), the psychological cognition, emotional state, and ability of the individual organism (O) will change, and thus, a response (R) in the form of a behaviour will occur [26]. Therefore, the “SOR” model allows researchers to integrate various factors into systematic theory building. This study was aimed at determining how the organizational climate for evidence-based practice (S) stimulates the occurrence of evidence-based practice behaviour (R) through the mediating effect of individual factors (O), namely, evidence-based practice competence, work control, and the intention to implement evidence-based practice. For nursing practice, these results have the potential to provide nurse leaders with theory-based evidence to support strategies toward encouraging evidence-based practice behaviour among nurses and thereby improve other outcomes for nurses, patients, and health care organizations.

2. Literature Review and Hypotheses

The aim of this study was to investigate the effect of the organizational climate for evidence-based practice on evidence-based practice behaviour among nurses through the mediating role of evidence-based practice competence, work control, and the intention to implement evidence-based practice. The hypothesized model for this study is presented in Figure 1.

2.1. Organizational Climate for Evidence-Based Practice and Evidence-Based Practice Behaviour. “Organizational climate” refers to “the collective understanding that organizational members attribute to the events, policies, practices, and procedures they encounter, along with the behaviors they observe being rewarded, supported, and expected” [27]. It primarily includes seven core dimensions: organizational philosophy, environmental atmosphere, work style, teamwork, leader support, training, and resource provision [28]. Empirical studies have shown that it represents a single, overarching factor that captures employee evaluations of how the work environment impacts their personal well-being [29]. According to the previous research study, the barriers from organizational factors to the implementation of evidence-based practice include inadequate resources and infrastructures, lack of leadership support and evidence-based practice mentors, a weak culture of evidence-based practice, and less collaboration between academics and clinics [10, 20, 30]. Most of the literature focuses on a single aspect of the organizational climate for evidence-based practice. Therefore, this study integrates existing organizational factors of evidence-based practice into the concept of organizational climate for evidence-based practice, which represents an organization’s larger social context. The first

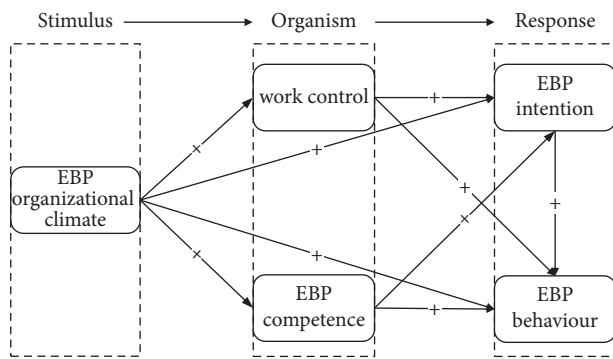


FIGURE 1: The hypothesized study model. This model presents hypothetical relationships among the variables. Note. “+” = positive correlation; EBP, evidence-based practice.

aim of this study was to examine whether an organizational climate for evidence-based practice that integrates multiple organizational factors could promote nurses’ evidence-based practice behaviour.

Hypothesis 1. The organizational climate for evidence-based practice is positively and directly related to nurses’ evidence-based practice behaviour.

2.2. Evidence-Based Practice Competence and the Intention to Implement Evidence-Based Practice as Mediators. In addition, we attempt to explore the mechanisms through which an organizational climate for evidence-based practice enhances evidence-based practice behaviour among nurses. Evidence-based practice competence and the intention to adopt evidence-based practice have been recognized as strong precursors to their subsequent utilization and actual practice [12, 25]. For individuals to implement evidence-based practice effectively, nurses need to be motivated in which they have a desire to seek out the best information that serves the needs of their patients, and they need to be competent in which they must have the necessary knowledge, skills, and attitudes that can be linked to evidence-based practice [24, 31]. However, the findings indicated that the nurses did not feel prepared for evidence-based practice. A systematic review of 18,355 nurses from 21 countries revealed that nurses did not use the best evidence in practice because of insufficient evidence-based practice knowledge and skills [30]. The lack of evidence-based practice competence results in lower confidence in implementing these practices.

Notably, the competence and intention underlying evidence-based practice have been associated with the organizational climate, such as the evidence-based practice mentoring, training, and supportive culture [16]. A survey revealed that advanced practice nurses, as “opinion leaders,” significantly influence the evidence-based practices of front-line nurses [23], and the top three sources of evidence-based practices that nurses obtained were information from specialists, instructors, and senior nurses [32]. Therefore, evidence-based practice mentoring can promote the competence of nurses in successfully engaging in evidence-based

practice. In addition, training was seen as important in explaining the likelihood of future implementation of evidence in clinical nursing practice [10]. The reason is that after continuing education programs of evidence-based practice in hospitals, nurses’ evidence-based practice knowledge scores improved [33]. The findings of Melnyk demonstrated evidence-based practice culture as a key variable that directly affects evidence-based practice knowledge, beliefs, and competency [5]. Therefore, this study was aimed at examining whether an organizational climate for evidence-based practice could promote this behaviour among nurses through evidence-based practice competence and intention.

Hypothesis 2. Evidence-based practice competence mediates the relationship between the organizational climate and evidence-based practice behaviour.

Hypothesis 3. The intention to implement evidence-based practice mediates the relationship between the organizational climate and evidence-based practice behaviour.

Hypothesis 4. Evidence-based practice competence and the intention to implement evidence-based practice play a chain mediating role between the organizational climate and evidence-based practice behaviour.

2.3. Work Control and the Intention to Implement Evidence-Based Practice as Mediators. Work control is an essential work characteristic that is generally defined as “one’s control over one’s task, conduct, and performance or the ability to have influence over one’s work and work environment to obtain a rewarding work situation, such as control of work efficiency (e.g., the method, amount, and speed for increasing efficiency), control of work resources (e.g., the perception of authority in regard to job-related information, procedures, or materials for meeting the demands of the job), and control of work environment (e.g., decoration of the work area and protection of the working environment from interference)” [34]. A sense of high work control has been demonstrated to increase work engagement and stimulate intrinsic motivation [35]. Under conditions of high work control, nurses’ performance in relation to evidence-based practice is actually fostered.

According to the literature review, the barriers to implement evidence-based practice are insufficient time for involvement in this practice, inadequate resources and infrastructure, and a lack of authority and autonomy to make practice changes [10, 24]. This result suggests that nurses have a low sense of work control when implementing evidence-based practice. When nurses perceive a lack of control over their work, particularly in relation to resources and the environment, they are less inclined to engage in evidence-based practice, even if they have sufficient evidence-based practice competence. This low engagement occurs because these factors are often beyond the control of the individual [24]. The provision of significant support to nurses, including time, funding, administrative support, and

mentors [19], enables nurses to exert greater control over their resources, environment, and efficiency. This control may facilitate nurses' willingness to implement evidence-based practices. Although existing studies lack enough investigation and further study about nurses' work control in evidence-based practice, there may be a relationship among work control, intention to implement evidence-based practice, and organizational climate for evidence-based practice. However, the exact underlying mechanism remains unclear. Therefore, this study examined whether an organizational climate for evidence-based practice could promote nurses' evidence-based practice behaviour through work control and intention.

Hypothesis 5. Work control mediates the relationship between the organizational climate and evidence-based practice behaviour.

Hypothesis 6. Work control and the intention to implement evidence-based practice play a chain mediating role between the organizational climate and evidence-based practice behaviour.

3. Methods

3.1. Design. This study was a descriptive, cross-sectional survey that gathered data from nurses in China in 2022.

3.2. Participants. The survey was conducted with a population of nurses from 6 hospitals in 6 cities in China: Beijing, Shanghai, Guangzhou, Zhengzhou, Shenyang, and Urumqi. With the help of the nursing managers, surveys were sent to the nurses using a convenient sampling method. The inclusion criteria were as follows: those who (a) had obtained the professional qualification nursing certificate from the People's Republic of China, (b) were working in the hospital during the investigation period, and (c) had at least 1 year of evidence-based practice experience. The exclusion criteria counted those who were not willing to participate or were absent during the survey.

3.3. Data Collection. Although the minimum sample size for structural equation model analysis is 200 [36], 380 to 760 participants would be considered to be the optimal sample size because of the 76 items included, according to the principle that the sample size is approximately 5 to 10 times the number of scale items [37]. Assuming a 20% attrition rate based on previous studies conducted in China [38], the minimum sample size was 456.

We explained the purpose and method of this study to the nursing managers of each hospital, invited them to serve as research assistants, and provided them with training on the study. After learning about the implementation of evidence-based practices in the hospital and obtaining permission, the researchers or trained research assistants distributed the questionnaires to the clinical departments that met the inclusion criteria. All the data were collected using electronic questionnaires. The purpose of this study

was explained, and detailed instructions were given to the guide nurses about filling out the questionnaires. After the anonymity and confidentiality of participation were explained, the nurses were informed that they were free to refuse to participate or withdraw from participation at any time without penalty. A total of 700 questionnaires were distributed, 650 of which were completed and returned to the researchers. After being checked by 2 researchers, 9 electronic questionnaires were excluded because they had the same answers (e.g., all 4s or all 5s), and 641 questionnaires (91.57%) were determined to be valid.

3.4. Instruments. Five self-report instruments were employed in this study. Two of these are widely used in China (Work Control Scale and Evidence-Based Behaviour Scale). Two were self-developed (Intention to Implement Evidence-Based Practice Scale and Organizational Climate for Evidence-Based Practice Scale), and one was a Chinese translation of the English version (Evidence-Based Practice Competency for Practicing Registered Nurses Scale). The self-developed or translated scales were tested in two stages, with stage 1 comprising the creation (or translation) and adaptation of the scales and stage 2 evaluating the psychometric properties of the scales. These 3 instruments were initially pretested among eligible participants who were excluded from this study.

3.4.1. Work Control. The 19-item Chinese version of the Work Control Scale for nurses [34] comprises three domains: control of work efficiency, control of work resources, and control of work environment. A 5-point Likert scale is used, ranging from 1 (almost not) to 5 (very much), with higher scores indicating greater levels of work control. The internal consistency reliability (0.90) and test-retest reliability (0.77) of the scale indicated good reliability [34]. Cronbach's α was 0.930 in this study.

3.4.2. Evidence-Based Practice Behaviour. Evidence-based practice behaviour was measured using the Chinese version of the Evidence-Based Practice Questionnaire (EBPQ) [39]. It comprises 3 subscales: use of evidence-based practice, attitude towards evidence-based practice, and knowledge/skills associated with evidence-based practice. The subscale "use of evidence-based practice" was adopted to measure the implementation of evidence-based practice by Anaman-Torgbor et al. [40] and consists of 6 items. All items are scored on a 7-point Likert scale ranging from 1 (never) to 7 (always), with a higher score indicating a more positive implementation of evidence-based practice. Cronbach's α of the subscale was 0.84 [39]. Cronbach's α was 0.911 in this study.

3.4.3. Evidence-Based Practice Competence. The Evidence-Based Practice Competency for Practicing Registered Nurses Scale [16] was modified by our team using the "translation-back-translation-cultural adaptation" procedure in accordance with Chinese cultural background.

This scale consists of 13 items, which are rated on a 4-point Likert scale ranging from 1 (not competent) to 4 (highly competent). A higher score indicates a higher level of self-rated competence. The internal consistency was 0.98 [5]. Cronbach's α was 0.917 in this study.

3.4.4. Intention to Implement Evidence-Based Practices. The nurses' intentions to implement evidence-based practices were measured by using a scale developed by our team in this study. This scale consists of 4 items, which are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater levels of intention to implement evidence-based practice. Cronbach's α was 0.865 in this study.

3.4.5. Organizational Climate for Evidence-Based Practice. The organizational climate for evidence-based practice was measured by using a scale developed by our team in this study. It consists of 28 items divided into 7 dimensions, including the organizational philosophy, environmental atmosphere, work style, teamwork, leader support, training, and resource provision. All the items are scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicated a stronger organizational climate for evidence-based practice. The scale has good internal consistency for the overall scale (Cronbach's $\alpha = 0.948$) and 7 dimensions (Cronbach's $\alpha = 0.851, 0.810, 0.831, 0.887, 0.869, 0.883, \text{ and } 0.872$) in this study.

3.5. Data Analysis. IBM SPSS 26.0 and AMOS 24.0 were used for the statistical analysis of the data. Descriptive statistics were used to quantify the collected data. The mean and standard deviation were used to describe continuous variables, and the frequency and percentage were used to describe categorical variables. The correlations among evidence-based practice competence, work control, the intention to implement evidence-based practice, the organizational climate, and evidence-based practice behaviour were analysed using Pearson correlations. Structural equation modelling was used to test the hypothesized study model. The following criteria were used to evaluate the model: $\chi^2/df < 5$, RMSEA < 0.08 , GFI > 0.9 , NFI > 0.9 , IFI > 0.9 , TLI > 0.9 , and CFI > 0.9 [41]. The bootstrap method was used to iterate 5000 times to estimate the mediating effect. The confidence intervals were 95% confidence intervals and did not contain 0, which signifies statistical significance.

3.6. Ethical Approval. Ethical approval was not needed because no unethical behaviour was present in this study, and our study did not involve human clinical trials or animal experiments. The professionals were invited to participate voluntarily through the electronic questionnaire. They were informed about the objectives of the study, with clarification that their participation was completely anonymous and that submitting the questionnaire granted their consent for participating in the study.

4. Results

4.1. Demographic Profile of Participants. Table 1 shows that most of the nurses who completed the survey ($n = 641$) were female (97.04%), had worked in the Department of Internal Medicine (64.27%), had a bachelor's degree (79.72%), had teaching experience (52.57%), had research experience (24.80%), and had 6–15 years of clinical experience (58.97%).

4.2. Descriptive Statistics and Correlational Analysis of Variables. As presented in Table 2, the mean overall score of the organizational climate for evidence-based practice was 3.66 (SD = 0.57), the evidence-based practice competency score was 2.65 (SD = 0.55), the work control score was 3.48 (SD = 0.60), the intention to implement evidence-based practice score was 3.90 (SD = 0.81), and the evidence-based practice behaviour score was 4.16 (SD = 1.32). The correlation analysis results show that there were positive impacts among the independent variable (organizational climate for evidence-based practice), the dependent variable (evidence-based practice behaviour), and the mediating variables (competence, work control, and intention for evidence-based practice implementation). Tables S1–S5 show the results of the *t*-test or analysis of variance (ANOVA) for the variables above.

4.3. Verification of Research Hypotheses. First, we assessed the measurement model, which included five latent constructs (organizational climate for evidence-based practice, evidence-based practice competence, work control, intention to implement evidence-based practice, and evidence-based practice behaviour) and 23 observational variables. Confirmatory factor analysis revealed that the model fit the data well ($\chi^2 = 288.973$, $df = 221$, $\chi^2/df = 1.308$, RMSEA = 0.022, GFI = 0.963, NFI = 0.962, IFI = 0.991, TLI = 0.990, and CFI = 0.991) (see Figure 2), and all the indicators were significantly loaded on the corresponding constructs.

Second, as presented in Figure 2, we verified whether the organizational climate for evidence-based practice positively affects evidence-based practice behaviour (Hypothesis 1). Table 3 shows that the organizational climate for evidence-based practice significantly affected evidence-based practice behaviour ($\beta = 0.25$, $p < 0.001$). Table 4 reveals the direct, indirect, and total effects of the final model. The results demonstrated that the 95% confidence intervals of all of the effects did not overlap with zero, which indicated that all the direct and indirect effects were significant. Direct effects accounted for 45.93% of the total effect. This result indicates that the organizational climate for evidence-based practice can predict evidence-based practice behaviour well.

Lastly, we tested a mediating effect model to verify whether evidence-based practice competence, work control, and intention to implement evidence-based practice mediate the relationship between organizational climate and evidence-based practice behaviour. Table 3 shows that organizational climate for evidence-based practice significantly affected evidence-based practice competence

TABLE 1: Demographic profile of the participants ($n = 641$).

Characteristics	Frequency (f)	Percentage (%)
Sex		
Male	19	2.96
Female	622	97.04
Highest educational attainment		
College	108	16.85
Bachelor	511	79.72
Master	22	3.43
Doctorate	0	0.00
Working years		
≤ 5	157	24.49
6–10	203	31.67
11–15	175	27.30
16–20	55	8.58
≥ 21	51	7.96
Teaching experience		
Yes	337	52.57
No	304	47.43
Research experience		
Yes	159	24.80
No	482	75.20
Department		
Department of internal medicine	412	64.27
Department of surgery	87	13.57
Department of gynaecology	28	4.37
Department of paediatrics	28	4.37
Emergency room	7	1.09
Other departments	79	12.32

TABLE 2: Descriptive statistics and Pearson correlation of all the variables ($n = 641$).

	Cronbach's α	Mean (SD)	1	2	3	4	5
(1) Organizational climate for EBP	0.94	3.66 (0.57)	1				
(2) EBP competence	0.89	2.65 (0.55)	0.37**	1			
(3) Work control	0.92	3.48 (0.60)	0.50**	0.23**	1		
(4) EBP intention	0.87	3.90 (0.81)	0.45**	0.39**	0.38**	1	
(5) EBP behaviour	0.89	4.16 (1.32)	0.50**	0.42**	0.40**	0.43**	1

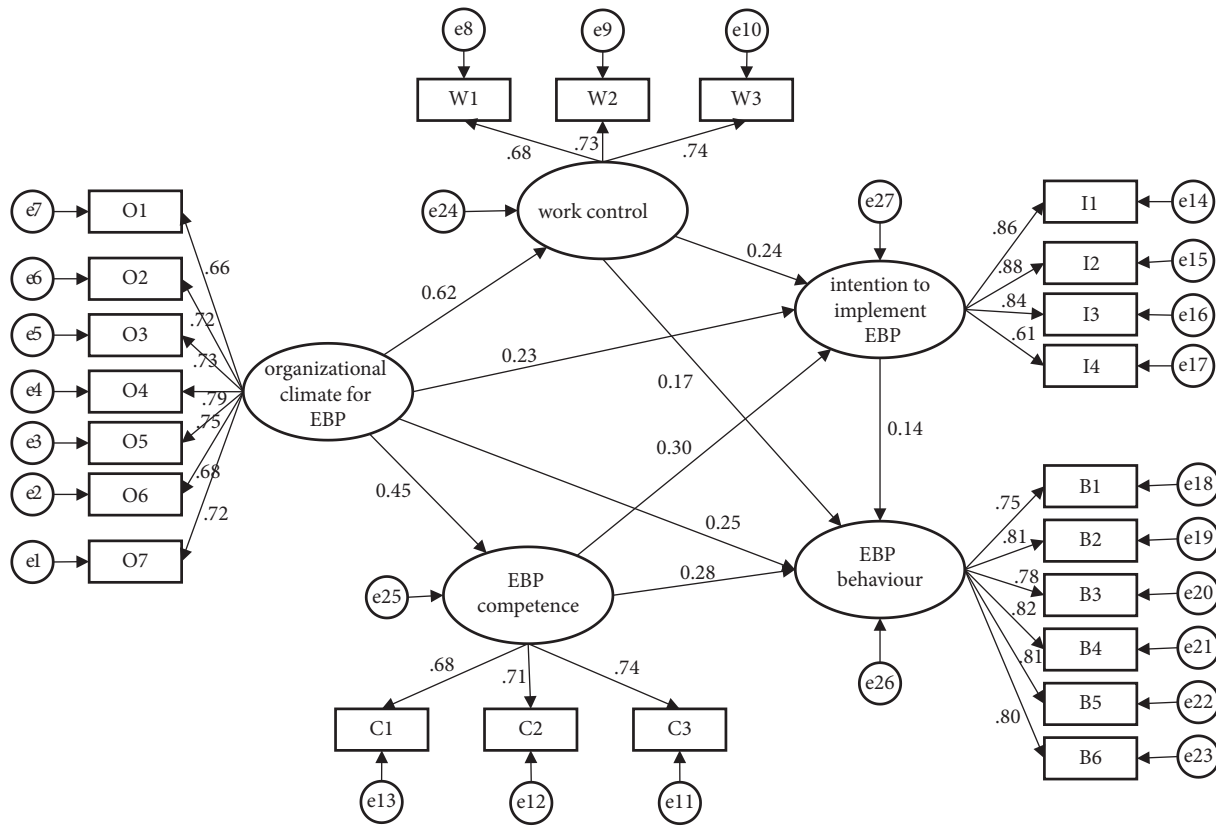
Note. ** $P < 0.01$; EBP, evidence-based practice.

($\beta = 0.45$, $p < 0.001$), which in turn had a positive effect on evidence-based practice behaviour ($\beta = 0.28$, $p < 0.001$). The indirect effect of the organizational climate on evidence-based practice behaviour via evidence-based practice competence accounted for 22.24% of the total effect (Hypothesis 2). The organizational climate for evidence-based practice significantly affected the intention to implement evidence-based practice ($\beta = 0.23$, $p < 0.001$), which had a positive effect on evidence-based practice behaviour ($\beta = 0.14$, $p = 0.003$). The indirect effect of the organizational climate on evidence-based practice behaviour via intention accounted for 5.79% of the total effect (Hypothesis 3). The organizational climate for evidence-based practice significantly affected the work control ($\beta = 0.62$, $p < 0.001$), which had a positive effect on evidence-based practice behaviour ($\beta = 0.17$, $p = 0.002$). The indirect effect of the organizational climate on evidence-based practice behaviour via work control accounted for 18.99% of the total effect (Hypothesis 5). The data indicated that evidence-based practice competence, work control, and intention played a partial

mediating role between the organizational climate and evidence-based practice behaviour, and the indirect effect accounted for 47.02% of the total effect. Moreover, evidence-based practice competence significantly affected the intention to implement evidence-based practice ($\beta = 0.30$, $p < 0.001$), and work control significantly affected the intention to implement evidence-based practice ($\beta = 0.24$, $p < 0.001$). The data demonstrated that competence and intention, as well as work control and intention, played a chain mediating role in the influence of the organizational climate on evidence-based practice behaviour (Hypotheses 4 and 6). The chain indirect effects accounted for 3.25% and 3.80% of the total effects, respectively.

5. Discussion

According to the analysis of the survey data, the organizational climate for evidence-based practice positively affected evidence-based practice behaviour. This finding was supported by a study that revealed that nurses working in



Goodness-of-fit-indices
 $\chi^2=288.973$, $df=221$, $\chi^2/df=1.308$, $RMSEA=.022$,
 $GFI=.963$, $NFI=.962$, $IFI=.991$, $TLI=.990$, $CFI=.991$

FIGURE 2: Mediation model. This model describes the paths between the variables and shows the standardized path coefficients. *Note.* EBP, evidence-based practice.

TABLE 3: Path coefficient between variables.

Path	Standardized β	Unstandardized B	S.E.	t	P
Organizational climate for EBP → EBP behaviour	0.25	0.55	0.12	4.49	<0.001
EBP competence → EBP behaviour	0.28	0.71	0.13	5.55	<0.001
Work control → EBP behaviour	0.17	0.44	0.15	3.05	0.002
Intention to implement EBP → EBP behaviour	0.14	0.21	0.07	2.96	0.003
Organizational climate for EBP → intention to implement EBP	0.23	0.33	0.08	3.89	<0.001
EBP competence → intention to implement EBP	0.30	0.51	0.08	6.07	<0.001
Work control → intention to implement EBP	0.24	0.42	0.10	4.21	<0.001
Organizational climate for EBP → work control	0.62	0.51	0.05	11.23	<0.001
Organizational climate for EBP → EBP competence	0.45	0.37	0.04	8.78	<0.001

Note. EBP, evidence-based practice.

departments with better organizational contextual features (organizational culture; leadership; networks and communication; resources; evaluation, monitoring, and feedback; and champions) engaged in greater use of evidence-based practice [8]. Leadership engagement, the availability of resources, and the provision of educational support, which are the three major components of organizational climate, are all key indicators of whether practice climates are conducive to evidence-based practice implementation [27]. This is because nurses will implement evidence-based practices more proactively to a greater extent when they perceive their

organizational climate as more supportive. In addition, positive feedback from nursing managers can enhance nurses' sense of responsibility and accomplishment and foster the use of evidence-based practices in a virtuous circle. Thus, improving the organizational climate for evidence-based practice in the department makes great sense in promoting evidence-based practice behaviour.

In this survey, evidence-based practice competence mediated the relationship between the organizational climate and evidence-based practice behaviour, which contributed the most to the indirect effect. We can predict that

TABLE 4: Confidence interval of mediating effect value.

Path	Effect	S.E.	95% LCI	95% UCI	Ratio (%)
Direct effect					
EBP organizational climate → EBP behaviour	0.254	0.075	0.107	0.402	45.93
Total indirect effect	0.299	0.056	0.192	0.411	54.07
EBP organizational climate → work control → EBP behaviour	0.105	0.051	0.014	0.210	18.99
EBP organizational climate → EBP competence → EBP behaviour	0.123	0.040	0.060	0.221	22.24
EBP organizational climate → intention to implement EBP → EBP behaviour	0.032	0.019	0.003	0.079	5.79
EBP organizational climate → work control → intention to implement	0.021	0.011	0.004	0.050	3.80
EBP → EBP behaviour					
EBP organizational climate → EBP competence → intention to implement	0.018	0.009	0.003	0.042	3.25
EBP → EBP behaviour					
Total effect	0.553	0.045	0.462	0.638	100.00

Note. EBP, evidence-based practice.

professional nurses present weakness in the implementation of evidence-based practice related to the lack of evidence-based practice competence. This finding is consistent with the results of previous research [42, 43]. Research has demonstrated that nursing education and training have a positive influence on the successful achievement of evidence-based practice competence [44]. However, prior studies have typically focused on “theory-based” education, which does not meet the needs of complex, dynamic clinical environments [31]. Researchers refer to this issue as the “theory-practice gap.” Nurses face changes in the context of health care services, such as the emergence of constantly updated evidence, medical knowledge and technology, different stakeholder attitudes, and dynamic clinical resources and conditions. Therefore, we should attempt to improve evidence-based practice competence continuously, not only during the undergraduate years but also throughout the careers of health professionals. As one of the core factors during a professional career, a good organizational climate can promote evidence-based practice competence in the following ways: (a) ensuring nurses’ knowledge and skills in complex clinical environments (e.g., through “practice-based” training, mentoring, teamwork, and work styles) and (b) enhancing attitudes and beliefs about evidence-based practices (e.g., through leader support, culture, and resource provision).

Furthermore, work control mediated the relationship between organizational climate and evidence-based practice behaviour, which contributed to the second indirect effect. Although evidence-based practice competence is considered the core factor of implementing evidence-based practice, some studies have found that even nurses who possess evidence-based practice competence are not necessarily able to use it flexibly in a changeable environment [18]. This lack of application is a potential result of neglecting nurses’ perceptions of their environment, resource reconfiguration, and control of themselves. This study revealed that work control, which is the ability to cope with the actual working situation, may be another important individual factor affecting evidence-based practice behaviour. According to our survey, nurses generally believe that controlling resources (e.g., financial resources, policy, staffing, and infrastructure) and the environment (e.g., atmosphere and work style) are

the most difficult factors, and these issues can be solved by improving the organizational climate for evidence-based practice. In addition, nursing managers need to provide nurses with more opportunities and incentives to promote evidence-based practices, such as further study, bonuses, and staff development. Managers can improve nurses’ control of their work by (a) creating more opportunities for nurses to work more freely and autonomously; (b) attracting nurses to participate in management decisions, such as the formulation of department rules and regulations, performance evaluations, and salary incentive systems; and (c) assigning young and highly educated nurses with the ability to challenge and innovate work tasks to enhance their sense of accomplishment.

Lastly, the study demonstrated that the intention to implement evidence-based practice mediates the relationship between organizational climate and evidence-based practice behaviour. Moreover, evidence-based practice competence and the intention to implement evidence-based practices had a chain mediating effect on the relationship between organizational climate and evidence-based practice behaviour, and work control and intention had the same chain mediating effect. Intention is the tendency and motivation before taking action, which is seen as a strong precursor to the subsequent utilization of evidence-based practice [45]. A more recent study also identified several factors that strengthened intentions to adopt evidence-based practices, including nurses’ capabilities, beliefs, attitudes, support received from nurses and other faculty members, adequate clinical and academic support, and Internet and journal access [46, 47]. Nurses are more confident and willing to use evidence-based practices, which is significantly associated with both nurse variables (evidence-based practice competence and control of work) and organizational variables (organizational climate for evidence-based practice).

6. Limitations

There are several limitations in our study that need to be improved upon through follow-up research. First, our study was conducted in the form of a self-report questionnaire, and the results are relatively subjective. Second, our research

was only performed in some provinces in China. Therefore, the sample has some limitations. In future research, we will further expand the sample size and involved regions to make the sample more representative.

7. Conclusions

This study confirmed that the organizational climate for evidence-based practice is critical for predicting and enhancing evidence-based practice behaviour. Evidence-based practice competence, work control, and the intention to implement evidence-based practice are intervening mechanisms that explain how organizational climate promotes evidence-based practice behaviour.

8. Implication for Nursing Management

Our findings highlight the need for nurse managers to be aware that the organizational factor (the organizational climate for evidence-based practice) influences evidence-based practice behaviour through individual factors (evidence-based practice competence, work control, and intention to implement evidence-based practice). This relationship suggests that nursing managers should pay attention not only to the factors influencing evidence-based practice behaviour but also the mechanism for the interaction between these factors. Although evidence-based practice competence is the most important individual factor for evidence-based practice behaviour according to previous studies, work control should be enhanced as another important individual factor. Managers should improve the organizational climate by providing nurses with culture and team support, training projects, and resource provisions. They should also enforce more autonomy and authority at work, which are beneficial to evidence-based practice competence, work control, and the intention to adopt evidence-based practice.

Data Availability

The data that support the findings of this study are available upon request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethical Approval

Ethical approval was not needed because no unethical behaviour existed in the study, and our study did not involve human clinical trials or animal experiments.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Supplementary Materials

Tables S1–S5 show the results of the *t*-test or analysis of variance (ANOVA) for the following variables: organizational climate, evidence-based practice competence, work control, and intention to implement evidence-based practice and evidence-based practice behaviour. (*Supplementary Materials*)

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Research Article

Impact of Emotional Labor and Positive Psychological Capital on the Turnover Intention of Nurses Caring for Patients with COVID-19: A Descriptive Survey Study

Mira Kwon¹ and Yeongsuk Song² 

¹Kyungpook National University Hospital, Clinical Trial Center, Daegu, Republic of Korea

²Kyungpook National University College of Nursing, Research Institute of Nursing Science, Daegu, Republic of Korea

Correspondence should be addressed to Yeongsuk Song; asansong@knu.ac.kr

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Nurses' turnover intention has increased since the COVID-19 pandemic. Emotional labor is reportedly high among nurses in Korea, and a positive psychological capital can help reduce turnover intention. This cross-sectional study investigated the factors influencing turnover intention in nurses during the COVID-19 pandemic. Survey data were collected from 155 nurses caring for patients with COVID-19 at a university hospital in South Korea in March 2022. Self-reported and paper-based questionnaires on emotional labor, positive psychological capital, and turnover intention were employed. The mean values for emotional labor, positive psychological capital, and turnover intention were 54.52/80, 58.03/90, and 38.92/50, respectively, and 77.8% of nurses reported planning to quit working. Turnover intention correlated with emotional labor ($r = 0.17$; $p = 0.041$) and had no significant relationship with positive psychological capital. Sex ($\beta = 0.24$; $p = 0.003$) and emotional labor ($\beta = 0.18$; $p = 0.019$) affected turnover intention, with 9% explanatory power. Female nurses caring for patients with COVID-19 had a higher turnover intention than male nurses. Finally, the higher the emotional labor of nurses caring for patients with COVID-19, the higher the turnover intention. To reduce the turnover intention of nurses, hospitals need to help them enhance their emotional labor and positive psychological capital by establishing measures such as emotional coaching programs or psychological capital interventions.

1. Introduction

Coronavirus disease (COVID-19) is an infectious respiratory disease caused by the SARS-CoV-2 virus [1]. The current COVID-19 pandemic has placed greater burdens on the already exhausted nursing workforce, acting as a strong determinant of nurse resignation [2]. Accordingly, nurses' turnover intention has drastically increased since the pandemic outbreak [3], with a higher level in those caring for patients with COVID-19 than in those in general wards [4]. The International Council of Nurses (ICN) also noted the worsening high turnover rate of nurses and the shortage of nursing staff due to the COVID-19 pandemic, saying governments are working on mitigating the risk of increased turnover among nurses and improving nurse retention [5].

Along with these efforts, it is necessary to make efforts to lower nurses' turnover intention by identifying the factors affecting such intention among nurses caring for patients with COVID-19.

Nurses in the front line against the COVID-19 pandemic faced substantial changes in their workplace and experienced profoundly emotional labor in the care process of patients with COVID-19 [6]. Emotional labor refers to efforts to control one's actual emotions for effective job performance and to express specific emotions required by organizational norms [7]. Given that nurses constantly communicate with patients, they have to manage their own actual feelings [8]. The levels of nurses' emotional labor were above the average during this pandemic [8]. Higher levels of emotional labor were associated with higher levels

of nurses' turnover intention, and emotional labor was the strongest impact factor on turnover intention [9]. Therefore, in order to identify the factors to lower the turnover intention of nurses in charge of COVID-19 patients, it is necessary to investigate the effect of emotional labor of nurses in charge of patients with COVID-19 on turnover intention.

Nurses in the front line of the fight against COVID-19 are at risk of contagion and death, as well as encounter with a complex and unexpected scenario, which experiences the exposure of the nurses to difficulties that may hinder their emotional wellbeing [6]. A positive psychological capital implies a positive mental state that allows a person to achieve goals and improve performance according to individual psychological strengths [10]. Positive psychological capital has four dimensions: self-efficacy, optimism, resilience, and hope [11]. It also contributes to improving organizational performance, job satisfaction, and life satisfaction [12] and is a primary variable that reduces anxiety and depression experienced by healthcare professionals during the pandemic [13]. In 4865 Chinese nurses, psychological capital was a negative predictor of turnover intention; the higher the psychological energy, the more stable and the lower their intention to leave [14]. In other words, increasing the positive psychological capital contributes to greater job retention. Based on this background, there is a possibility that positive psychological capital may affect the turnover intention of nurses in charge of COVID-19 patients in Korea. Therefore, investigating the impact factor of positive psychological capital of nurses caring for patients with COVID-19 on turnover intention in Korea may be important.

During the COVID-19 pandemic, several studies have been conducted on nurses' turnover intention [2–4, 15], emotional labor [6, 8, 9], and positive psychological capital [14, 16, 17] separately. The studies described various emotional states and emotional labor experienced by nurses during the COVID-19 pandemic [6, 8] and the relationship between emotional labor and turnover intention [9, 18]. In addition, studies were conducted on the mediating role of psychological capital between nurses' COVID-19 fear and public health education [16], the relationship between psychological capital and turnover intention [14], and psychological capital's mediating role between perceived stress and posttraumatic stress disorder (PTSD) symptoms [17]. Moreover, it was also found that the turnover intention of nurses increased due to the increase in the workload (ICN, n.d.), fatigue [4], and stress [15] of nurses. However, few research studies have been conducted on the impact of emotional labor and positive psychological capital on turnover intention for nurses caring for COVID-19 patients. Nurses' turnover intention has been an important issue since the COVID-19 pandemic not only in South Korea but also internationally [2–4, 14, 15, 18–20], and their indicators should be identified to reduce it. Emotional labor and positive psychological capital are factors that affect nurses' turnover intention as mentioned earlier. Thus, this study aimed to investigate the impact of emotional labor and psychological

capital on the turnover intention of nurses caring for patients with COVID-19 in South Korea at a time when the pandemic is not over.

2. Methods

2.1. Study Design and Participants. The cross-sectional study design was used. Using convenience sampling, nurses working in three shifts and caring for patients with COVID-19 at a general hospital with more than 500 beds in South Korea were recruited. Sample size was calculated using the G*Power 3.1 program [21], with a significance level of 0.05, a medium effect size of 0.15, a power of 0.90, and 10 predictive factors. The required sample size for linear multiple regression was 147, but 170 paper-based questionnaires were distributed. A total of 158 nurses answered, with a survey response rate of 86.5%. However, one was incomplete, and two were duplicate. Ultimately, 155 responses were analyzed.

2.2. Instruments. Sociodemographic and working characteristics, such as age, sex, marital status, education, working department, clinical experience, length of experience caring for patients with COVID-19, and experience caring for patients with Middle East respiratory syndrome (MERS) or severe acute respiratory syndrome (SARS), were included in the structured questionnaires.

Emotional labor was assessed using the Emotional Labor Scale for nurses developed by Hong [22]. This 16-item scale consists of three subscales: emotional modulation efforts in the profession (7 items), patient-focused emotional suppression (5 items), and emotional pretense by norms (4 items). The items are scored on a 5-point Likert scale ranging from 1 ("not at all") to 5 ("very much"), and the total score is within 16–80. High scores indicate greater emotional labor. Cronbach's α during the scale development was 0.81 [22], whereas that in this study was 0.87.

Furthermore, positive psychological capital was evaluated using the Korean version of the Psychological Capital Questionnaire 24 (PCQ-24) developed by Luthans et al. [11] and revised by Lim [23] to suit the domestic situation in Korea. This 18-item scale has four subscales: self-efficacy (5 items), optimism (5 items), hope (5 items), and resilience (3 items). The items are scored on a 5-point Likert scale ranging from 1 ("not at all") to 5 ("very much"); the total score ranges 18–90, with higher scores indicating higher positive psychological capital. Cronbach's α during the revised scale was 0.92 [23], whereas that in this study was 0.91.

For measuring nurses' turnover intention, the Korean Nurse Turnover Intention Scale (K-NTIS) developed by Yeun and Kim [24] was used. This 10-item scale consists of three subscales: job satisfaction (4 items), interpersonal relationships (3 items), and work performance (3 items). Each item is scored on a 5-point Likert scale ranging from 1 ("not at all") to 5 ("very much"); the total score ranges 10–50, with higher scores indicating higher turnover intention. Cronbach's α during the scale development was 0.83 [24], whereas that in this study was 0.87.

2.3. Data Collection and Ethical Considerations. This study was conducted from March 18 to 27 of 2022 after being approved by the Clinical Trial Review Committee of Kyungpook University Hospital (IRB No.: KNUH 2022-02-014-002). Permission to collect data was obtained upon visiting the nursing departments that managed the quarantine area for patients with COVID-19 (2 intensive care units, 2 wards, and 1 emergency room). Given that the participants worked in three shifts, we visited the corresponding nursing department several times before and after shifts to explain the study's purpose and methods. The researcher explained enough so that each participant could complete the survey only once, and the permission form was prepared individually according to the IRB guidelines. The questionnaire was returned after that to provide sufficient time for the subjects.

Before data collection, written informed consent was obtained from nurses who wanted to participate in this study. The consent form acknowledged that the participants joined the research voluntarily and that they were explained that they could withdraw at any time without disadvantages. Furthermore, all data would be used for academic research purposes, and personal information would remain confidential. The participants received a small gift for completing the survey.

2.4. Data Analyses. The data were analyzed using SPSS Statistics 28.0. The participants' emotional labor, positive psychological capital, and turnover intention were measured using descriptive statistics to calculate the means and standard deviations. The differences of turnover intention according to the participants' characteristics were analyzed using a *t*-test and ANOVA. The correlation between variables was evaluated using Pearson's correlation coefficient, and the effects of the participants' emotional labor and positive psychological capital on turnover intention were determined by multiple regression analysis.

3. Results

3.1. Sociodemographic and Working Characteristics. Table 1 shows the participants' characteristics. Of the 155 participants, 92.9% were females and 72.3% were 22–29 years old, with a mean age of 29.15 years. Regarding marital status, 81.3% were single. In addition, 88.4% held a bachelor's degree or higher. The current place of work was mostly intensive care unit (ICU) (47.7%), followed by wards (33.5%) and emergency room (ER) (18.7%). The mean length of clinical experience was 5.92 years, with 60% participants having less than 5 years. The mean length of experience in caring for patients with COVID-19 was 10.81 months, with 51% under 6 months. Moreover, majority of the participants (94.8%) had no experience caring for patients with an emerging infectious disease such as MERS or SARS.

3.2. Descriptive Statistics and Differences on Turnover Intention. The mean scores of emotional labor, positive psychological capital, and turnover intention were

54.52 ± 7.55, 58.03 ± 9.06, and 38.92 ± 6.07, respectively. Table 1 shows the differences in turnover intention according to the participants' characteristics. A significant difference by sex was observed; female nurses had a higher turnover intention score than male nurses ($t = -3.31$; $p < 0.001$). However, no significant differences in turnover intention were noted according to age, marital status, education, department, clinical experience, length of experience caring for patients with COVID-19, and experience of caring for patients with MERS or SARS.

3.3. Relationships between Variables. Table 2 shows the results of the correlation analyses of emotional labor, positive psychological capital, and turnover intention. Emotional labor had statistically significant positive correlations with turnover intention ($r = 0.17$; $p = 0.041$) and positive psychological capital ($r = 0.17$; $p = 0.041$). However, no significant correlation was noted between positive psychological capital and turnover intention.

3.4. Multivariable Linear Regression Analysis. Table 3 demonstrates the regression analysis results of the effects of emotional labor and positive psychological capital on turnover intention. Before the regression analysis, the multicollinearity between independent variables was examined. The tolerance ranged between 0.94 and 0.97, and all values were above 0.1. In addition, the variance inflation factor was 1.03–1.07. Thus, no problem in multicollinearity was observed between the independent variables. Moreover, the Durbin–Watson value for the independence test of the residuals was 1.86, which is close to the reference value of 2, implying that autocorrelation problem of the error did not occur.

In controlling the sex variable, which showed a significant difference in turnover intention, a dummy variable was changed. At step 1, sex was a significant impact factor on turnover intention ($\beta = 0.26$; $p = 0.001$). At step 2, sex ($\beta = 0.24$; $p = 0.003$) and emotional labor ($\beta = 0.18$; $p = 0.019$) were affecting turnover intention. In this context, female nurses and having greater emotional labor were associated with a higher turnover intention, and the explanatory power of these variables for turnover intention was 9% (Table 3).

4. Discussion

In this study, the mean score of emotional labor among the nurses caring for patients with COVID-19 was 54.52, which is consistent with the previous study that the mean was 55.62 for 171 nurses working at comprehensive nursing care service wards in South Korea [25]. Before or during the COVID-19 pandemic, nurses' emotional labor was above average. During the pandemic, it became severe because of barriers caused by personal protective equipment (PPE) use, low trust relationships, and negative responses from infected patients [6]. For the positive psychological capital of our participants, the score was 58.03. This result was similar to Mubarak et al. [16] study, which the positive psychological

TABLE 1: Participants' characteristics and differences in turnover intention ($N=155$).

Variables	Category	n (%)	$M \pm SD$	t/F (p)
Sex	Male	11 (7.1)	3.33 ± 0.75	-3.31 (<0.001)
	Female	144 (92.9)	3.94 ± 0.57	
Age (years)	22-29	112 (72.3)	3.92 ± 0.57	0.41 (0.663)
	30-39	31 (20.0)	3.81 ± 0.79	
	40-52	12 (7.7)	3.83 ± 0.61	
Marital status	Single	126 (81.3)	3.90 ± 0.05	0.50 (0.618)
	Married	29 (18.7)	3.84 ± 0.13	
Education	Associate degree	18 (11.6)	3.86 ± 0.17	-0.23 (0.818)
	\geq Bachelor	137 (88.4)	3.90 ± 0.05	
Current place of work	Ward	52 (33.5)	3.80 ± 0.08	1.43 (0.244)
	ICU	74 (47.7)	3.90 ± 0.07	
	ER	29 (18.7)	4.04 ± 0.11	
Clinical experience (years)	<5	93 (60.0)	3.90 ± 0.59	2.37 (0.097)
	5-<10	34 (21.9)	4.02 ± 0.46	
	\geq 10	28 (18.1)	3.89 ± 0.61	
Length of experience caring for patients with COVID-19 (months)	<6	79 (51.0)	3.88 ± 0.60	1.04 (0.357)
	6-<12	16 (10.3)	4.09 ± 0.58	
	\geq 12	60 (38.7)	3.85 ± 0.62	
Experience caring for patients with MERS or SARS	Yes	8 (5.2)	4.30 ± 0.16	1.97 (0.051)
	No	147 (94.8)	3.87 ± 0.05	

Note. COVID-19 = coronavirus disease 2019; MERS = Middle East respiratory syndrome; SARS = severe acute respiratory syndrome.

TABLE 2: Correlations of emotional labor, positive psychological capital, and turnover intention ($N=155$).

Variables	Emotional labor	Positive psychological capital r (p)	Turnover intention
Emotional labor	1		
Positive psychological capital	0.17 (0.041)	1	
Turnover intention	0.17 (0.041)	-0.13 (0.120)	1

TABLE 3: Factors affecting turnover intention.

Variables	B	SE	β	t	p	R^2	Adj. R^2	F (p)
Step 1	3.33	0.18		18.77	<0.001	0.07	0.06	10.94 (0.001)
Sex (male)†	0.61	0.18	0.26	3.31	0.001			
Step 2	2.99	0.48		6.27	<0.001	0.11	0.09	5.94 (0.001)
Sex (male)†	0.56	0.19	0.24	3.04	0.003			
Emotional labor	0.24	0.10	0.18	2.36	0.019			
Positive psychological capital	-0.13	0.10	-0.11	-1.37	0.174			
$R^2 = 0.11$, Adj. $R^2 = 0.09$, F (p) = 5.94 (<0.001)								

†Dummy coded.

capital score was 56.52 for 243 Pakistan nurses during the COVID-19 pandemic. The positive psychological capital is important for managing psychological pain [26] and reducing nurses' fear of COVID-19 [16]; thus, developing measures to increase it is necessary. Regarding the turnover intention of nurses caring for patients with COVID-19, the score was 38.92, which is consistent with the previous study that the score was 31.50 for 174 Korean nurses in 2022 [19]. The higher turnover intention present study may have resulted from the sudden and steep increase in nurses' work, which included wearing PPE while caring for patients with COVID-19, and the large number of patients being hospitalized [4].

Our study results indicated that emotional labor had a significantly positive correlation with positive psychological capital. Nurses with maladaptive cognitive emotional regulation experienced emotional problems, often associated with mental disorders such as depression or anxiety [17]. Nonetheless, possibly, through nurses' emotional labor experience, they were able to quickly recognize their patients' needs and adjust their emotions according to organizational norms, thereby positively influencing their role and job satisfaction improvement and enabling them to efficiently manage situational emotions [27]. The higher the level of psychological capital, the lower their intention in our current study. This is consistent with a previous study

involving 4865 nurses from 21 general hospitals randomized in China [14]. Many nurses have complained of mental health-related problems resulting from the prolonged COVID-19 situation [28, 29]; these problems appear to be a factor leading them to leave work. Nurses with a higher level of psychological capital can resolve difficulties and seek external help, and they are more stable at work; thus, their turnover intention is reduced [14].

In this study, sex was the leading factor influencing turnover intention, followed by emotional labor, with 9% explanatory power. At first, female nurses had a higher turnover intention than male nurses. Most previous studies [15, 20, 30] were shown contrary to our result. Mirzaei et al.'s [15] findings reported that male nurses had a higher turnover intention at a hospital in Iran during the COVID-19 outbreak, which might be a different culture of Iran that men having more difficulty tolerating a work setting where it is out of control during an outbreak of an infectious disease. Male nurses reported a greater inclination than female nurses in turnover intention of 1,245 Norwegian nurses [20]. It is a possible explanation on the current result that most nurses are composed of women in the current study and our country, and men should be the head of the family and have financial responsibilities in the Confucian culture. Therefore, sex differences in turnover intention should be further investigated, with equal sex ratios. In addition, intention turnover is different by sex in previous studies [31, 32], and possible explanations were follows: Alsaraireh et al. [31] found that job satisfaction had a negative correlation with turnover intention and that men nurses had a lower job satisfaction and a higher turnover intention than women nurses. In Japan, Minamizono et al. [32] analyzed 328 women nurses and inferred that the higher the burnout score, the higher the intention to change jobs. In other words, considering that the influencing factors of turnover intention vary by sex, increasing job satisfaction in men nurses and lowering burnout including emotional exhaustion in women nurses may reduce turnover intention.

This study showed that emotional labor was a significant factor influencing turnover intention, consistent with Bartram et al.'s [33] findings involving 183 nurses in Australia and 1160 nurses in China [18]. Emotional labor of eleven nurses in the front line against the COVID-19 pandemic in a Portuguese study was analyzed as five themes: challenges experienced by nurses in the front line, emotions experienced by nurses in service care, emotional responses of nurses and patients, emotional labor of nurses in the patient care process, and opportunities for development in the face of the emotional challenge required of nurses in combating COVID-19 [6]. Emotional labor can be overcome through an interpersonal or intrapersonal approach. Emotional support within the team facilitates the emotional labor's performance, which focuses on the patient and the relationship of care with emotional expression or touch, and self-focused emotional labor characterized by positive and adaptive emotional management [6]. In a previous study to verify the effect on nurses' emotional labor, resilience, and self-efficacy by applying an emotional coaching program for nurses, emotional coaching programs were useful for enhancing emotional labor management with 60 nurses

who worked at a general hospital [34]. Therefore, emotional labor programs and education to strengthen teamwork may be developed and applied to reduce nurses' intention to resign.

In this study, the relationship between positive psychological capital and turnover intention was not statistically significant, and positive psychological capital was not a factor that can influence turnover intention. These results are not consistent with a previous study in which psychological capital showed a significantly negative correlation with turnover intention for nurses [14]. One probable explanation is that people with high positive psychological capital would find better a working environment and job options any time when they are stressed out at work [35]; thus, it may not be an influence factor. Although our results differed from those of the previous study, psychological capital is essential for minimizing turnover intention [14]. Psychological capital intervention revealed significant improvements and remained stable over 1 month in the psychological capital [36]. In addition, nurse managers conducted psychological capital training courses and established a psychological capital enhancement system to reduce nurses' tendency to leave by improving their psychological capital level [14]. Therefore, psychological capital intervention may be applied to reduce nurses' turnover intention in organizational settings.

4.1. Study Limitations. This study has the following limitations: First, the study participants were from a single university hospital in South Korea, with more than 500 beds. Future studies should expand the research area for generalizability. Second, owing to the relatively high proportion of female nurses in the sample, the sex variable was controlled in the regression model to rule out the confounding effects; in future studies, sex should be controlled, or the sex ratio should be equal.

Moreover, given that nurses' turnover intention can affect not only the organization but also personal experiences or relationships with patients, developing a turnover intention-measuring scale that includes organization-related questions as well as questions about nurses' personal experiences and relationships with patients is necessary. However, despite these limitations, this study provides important findings concerning the factors that influence nurses' turnover intention, specifically the effects of sex and emotional labor.

5. Conclusions

This study reports the results of a descriptive survey to investigate the levels of emotional labor, positive psychological capital, and turnover intention in nurses caring for patients with COVID-19, clarifying the effects of emotional labor and positive psychological capital on turnover intention. Sex and emotional labor were identified as factors influencing turnover intention, with 9% explanatory power. Therefore, to lower the turnover intention of nurses in charge of patients with COVID-19, hospitals need to develop measures that can reduce their emotional labor.

5.1. Implications for Nursing Management. Increasing turnover intention in nurses implies decreasing nursing personnel; consequently, patients may not receive the proper nursing care. As a result of this study, nurses' emotional labor should be reduced to lower the turnover intention; this step can ultimately serve as a countermeasure to the shrinking workforce. Meacham et al. [9] said that high-involvement work practices (HIWPs) and individual resilience can buffer the negative effects of emotional labor on turnover intention of nurses. Based on this, it will be possible to increase HIWPs and develop resilience at the personal level to reduce emotional labor and consequently lower turnover intention. Also, the study findings are useful as foundational or applicable knowledge for developing programs designed to reduce the emotional labor of nurses caring for patients with COVID-19 not only in Korea but also internationally. To retain nurses, nurses and hospital managers should together implement programs aimed at reducing nurses' emotional labor and enhancing psychological capital (e.g., emotional coaching program and psychological capital intervention) and increase the number of nurses.

Data Availability

The data supporting the results of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Kwon and Song conceptualized and designed the study. Kwon acquired the data. Kwon and Song analyzed and interpreted the data. Kwon and Song drafted the manuscript. Kwon and Song gave the final approval of the manuscript submission. Kwon and Song agreed to be accountable for all aspects on accuracy or integrity of any part.

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Research Article

The Impact of Grit on Nurses' Job Performance: Evaluating Chained Mediation through Perceived Social Support and Self-Esteem

Xiqin Liu ¹, Jinguang Li,² and Song Wang ¹

¹Department of Radiology and Huaxi MR Research Center (HMRRRC), West China Hospital, Sichuan University/West China School of Nursing, Sichuan University, Chengdu, China

²College of Teacher Education, Dali University, Dali, China

Correspondence should be addressed to Song Wang; wangs_psych@163.com

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Background. Nurses play a critical role in the medical workforce during the COVID-19 pandemic while facing various difficulties and challenges. Grit, social support, and self-esteem are important psychosocial factors influencing job performance. However, few studies have explored the relationships among these factors in nurses. **Aim.** This study aimed to examine the association between grit and nurses' job performance during the COVID-19 pandemic and to explore the potential chain mediation through perceived social support and self-esteem. **Methods.** A cross-sectional survey design was employed. From January 2021 to May 2022, a total of 709 Chinese nurses in Chengdu and Kunming completed a web-based cross-sectional survey, which included standard assessments on grit, perceived social support, self-esteem, and job performance as well as Big Five personalities. The chain mediation model was tested using the PROCESS macro program in the SPSS software. **Results.** There was a moderate-to-large correlation ($r = 0.40$, $p < 0.001$) between grit and job performance in Chinese nurses. Furthermore, grit was indirectly linked to job performance through the chain mediating effect of perceived social support and self-esteem (all $p < 0.05$). These findings persisted even when Big Five personalities were included as additional controlling variables. **Conclusions.** This study reveals a stable link between grit and job performance among Chinese nurses and highlights the potential role of perceived social support and self-esteem in mediating this link. **Implications for Nursing Management.** Nursing managers can improve nurses' grit level and provide a supportive organizational environment conducive to enhancing self-esteem and thereby promoting their job performance.

1. Introduction

Accounting for the largest portion of the medical workforce [1], nurses play an increasingly important role in the healthcare system, especially highlighted by the COVID-19 pandemic [2]. The public labeled nurses as “heroes” because of their courage, bravery, commitment, resilience, and persistence during the pandemic [3]. Their work not only relates to the lives and health of patients but also plays a vital role in the management of public health and healthcare resources for society as a whole. Nevertheless, nurses had to face various difficulties and challenges such as working in high-risk environments, heavy workloads, insufficient

understanding and support from managers, and inadequate specialized training, which could result in burnout, lack of personal accomplishment, and lower efficiency and performance at work [4].

The complex situations during the pandemic exacerbated this dilemma and brought about organizational crises [5]. For instance, a survey by the American Nurses Foundation revealed that nearly 90% of the nurses reported staff shortages in their organizations and more than half of the respondents reported negative feelings such as being extremely stressed and undervalued during the COVID-19 pandemic [6], which may further lead to decreased personal performance at work [7]. In this context, probing the

psychosocial factors that may help nurses work effectively and improve performance addresses an important issue in nursing management and practice.

The active field of positive psychology offers novel insights into improving job performance [8], and one promising positive psychological construct is grit, a personality quality that can help explain why two individuals with the same level of intellectual ability are often observed to perform differently in a given field [9, 10]. Previous studies on different groups have indicated that grit positively impacts personal performance [10–13]. However, whether grit affects job performance in nurses and its underlying psychological mechanism remains unclear. Therefore, this study focused on the association between grit and job performance in nurses during the COVID-19 pandemic and explored the potential mediation mechanism underlying this association.

1.1. Grit and Job Performance. Grit, defined as perseverance and passion for long-term goals, is a nonintellectual trait essential to personal success and performance in various domains [10]. Gritty individuals are typified by working hard towards challenges with sustained efforts and interests despite failures, adversity, and plateaus [9, 10]. The well-established conservation of resources (COR) theory suggests that grit is an important personal resource that can facilitate goal achievement and promote personal growth and development [14, 15]. It is thought that individuals with high levels of grit are able to make better use of their abilities because they are less distracted by short-term goals and less discouraged by failures and setbacks that are commonly encountered in many performance areas [16], which can lead to better performance in those areas. Numerous empirical studies have demonstrated the positive effect of grit on personal performance in a wide range of fields covering students' academic performance [13, 17], employees' job performance [11, 18, 19], performance in military [20], and sports [21]. In particular, grit has been found to predict both the academic and clinical performance of nursing students after controlling for potential confounders including the year of study and demographic factors [13]. Despite the well-documented relationship between grit and performance in these areas, the impact of grit on job performance in nurses has not been robustly determined. Moreover, grit has been proposed as an essential trait of nurses during a disaster to enable them to complete the arduous tasks required [22]. Hence, the first aim of this study was thus to determine the association between grit and job performance in a sample of Chinese nurses during the COVID-19 pandemic.

1.2. Grit, Perceived Social Support, Self-Esteem, and Job Performance. Understanding how grit affects job performance is important for nursing managers developing effective strategies to improve nurses' job performance. Some have argued that goal pursuit and attainment are outcomes of interaction between personal resources and the environment [23, 24]. A qualitative study found that the social support system (e.g., family, friends, significant others,

superiors, or colleagues) is a major contributor of grit in achieving personal and work goals in Asian graduate students [25]. When people feel supported by others in their pursuit of long-term goals, they may display greater levels of perseverance, resulting in improved performance [25]. In return, gritty individuals are more likely to attract social support due to their unwavering dedication and passion, which may exert a positive effect on performance [24]. It has been demonstrated that perceived social support is more predictive and functional than received social support [26], even though they are highly correlated [27]. Perceived social support is defined as the perception of the available support from one's social networks [26]. Previous studies have found positive correlations between grit and perceived social support in adolescents [28] and nurses [29]. Moreover, there are also positive associations between perceived social support and nurses' task performance [30], particularly during the COVID-19 pandemic [31]. According to the Job Demands-Resources (JD-R) model [32], social support is a form of job resources provided to employees to deal with the job demands which can help them stay healthy and is therefore closely related to job performance [33]. Low levels of perceived social support have been reported to cause emotional exhaustion in working women during COVID-19 which may relate to the job performance [34]. On the other hand, it is suggested that certain personalities, e.g., grit, can help employees cope with job demands and increase their job resources, which in turn can lead to better job performance [35]. Hence, in investigating the relationship between grit and job performance, perceived social support can be regarded as an important mediator at the external influence level [25].

Self-esteem is another personal resource that helps motivate and facilitate goal attainment in COR theory, which has been shown to be an important indicator of personal performance [36–38]. Self-esteem refers to an individual's overall evaluation of their own worth, competence, and value [39]. High self-esteem stimulates self-potential [40] and is associated with many positive behaviors and outcomes such as enhanced learning motivations [41], less antisocial behavior [42], higher life satisfaction [43], and better physical and mental health [42, 44]. Importantly, self-esteem is one of four dispositional traits (i.e., self-esteem, generalized self-efficacy, locus of control, and emotional stability) that are significantly related to job satisfaction and job performance according to Judge, Locke, and colleagues' theory of core self-evaluations [45] and exhibits the highest correlation with job performance among the four traits [37]. Korman [46] self-consistency theory suggests that individuals with high self-esteem will perform effectively in order to maintain a positive self-image. On the other hand, prior research suggests that self-esteem shows a medium-sized association with grit [40, 47], and this may be related to the possibility that during the process of pursuing long-term goals with passion and persistence, gritty individuals can gain a better understanding about themselves and be more satisfied with themselves [48, 49], which may contribute to higher levels of self-esteem and better job performance. Thus, self-esteem may be an internal

factor that mediates the relationship between grit and job performance.

With respect to the relationship between perceived social support and self-esteem, it has been argued that social support is a critical component for maintaining individuals' self-esteem [31], while self-esteem can reflect the quality of interpersonal relationships based on the sociometer hypothesis [50, 51]. Several studies have found a positive correlation between perceived social support and individuals' self-esteem [43, 52, 53]. A recent study shows that the failure to receive online social support during COVID-19 can result in reduced self-esteem and increased loneliness [54]. According to the sociometer theory, when one's relational deficiencies are detected, self-esteem will be negatively affected in an automatic, unconscious way as an "internal monitor" [55]. By contrast, high perceived social support from family, friends, and significant others can enhance university students' self-esteem, promote their academic achievements, and mitigate their emotional exhaustion [47]. Furthermore, self-esteem is found to mediate the relationship between perceived social support and academic achievement [48, 56] as well as the intention to stay in nurses [57]. Previous studies have indicated that perceived social support and self-esteem sequentially mediate the association between Internet use and loneliness [54, 58]. Based on the above findings and theories, it is plausible to explore the chain mediation of perceived social support and self-esteem in the relationship between grit and nurses' job performance. The second aim of this study was thus to examine the indirect effect of grit on job performance with perceived social support and self-esteem as the intervening variables.

1.3. The Current Study. This study aimed to reveal the relationship between grit and nurses' job performance and particularly examine the sequential mediating roles of perceived social support and self-esteem in this relationship. The present study extends previous research in several respects. First, prior investigations into the link between grit and performance focused mainly on the academic and other professional domains [11, 17, 21], whereas few studies have tested it in nurses [59, 60]. Given the large number of Chinese nurses (i.e., 4.7 million as of 2020) and their heavy workloads and unprecedented pressure in the COVID-19 pandemic [61], it is essential to explore how Chinese nurses' grit influences their job performance. Second, although previous studies and theories suggest that social support and self-esteem may play a mediating role in the link between grit and job performance, no research has directly examined the mediating effect, especially the sequential mediating effect, of perceived social support and self-esteem between grit and job performance. Third, previous research generally did not control for similar psychological constructs such as Big Five conscientiousness when examining the relationship between grit and performance, which may be a reason for the inconsistent results of previous studies [10, 16]. Therefore, this study used well-validated measurements to investigate the intercorrelations among grit, job performance, perceived

social support, self-esteem, and Big Five personality traits in a large population of Chinese nurses ($n = 756$) during the COVID-19 pandemic. Then, we constructed a serial mediation model to test the chain mediating effects of perceived social support and self-esteem in the grit-job performance association and moreover tested the specificity of the results by controlling for effects of Big Five personalities in this model given that Big Five traits have been shown to relate robustly to grit [48] and job performance [62]. These analyses can help elucidate the mechanism and specificity of the impact of grit on nurses' job performance. Based on previous research, we proposed the following hypotheses:

Hypothesis 1: Grit is significantly and positively related to job performance in nurses

Hypothesis 2: Perceived social support mediates the relationship between grit and nurses' job performance

Hypothesis 3: Self-esteem mediates the relationship between grit and nurses' job performance

Hypothesis 4: Perceived social support and self-esteem sequentially mediate the relationship between grit and nurses' job performance

2. Methods and Materials

The present study was implemented using a cross-sectional survey design. We adhered to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines and methodology in reports of cross-sectional studies (see Supplementary Information: Table S1).

2.1. Participants and Procedures. A total of 756 nurses from several hospitals in Chengdu and Kunming in Southwest China through convenience sampling participated in this study between January 2021 and May 2022. Forty-seven participants who failed to pass the bogus items (e.g., I have five fingers on my left hand) that had only one correct answer in the survey [63] were excluded from analyses, resulting in a final sample of 709 respondents (643 females, age = 18–55 years, mean age = 31.74 ± 7.38 years) with an effective response rate of 93.78% [64]. The current sample size was far greater than the estimated sample size ($n = 207$) to detect medium-sized effects based on standard power analysis while considering 20% of incomplete surveys [65, 66]. The inclusion criteria were (a) obtaining a professional qualification certificate for nurses in the People's Republic of China, (b) having at least 1 year of experience in clinical nursing or nursing management, (c) having no previous or current diagnosis of mental illness or drug or alcohol dependence, and (d) having the skills to complete the questionnaires online. Trainee nurses, standardized training nurses, and nurses who were unable to complete the survey were excluded. Notably, none of the participants were infected with COVID-19 proved by their nucleic acid testing report.

The questionnaires were distributed through online recruitment to designated investigators in each hospital who had been trained by the researchers, in compliance with quarantine guidelines to mitigate the spread of COVID-19 infection. After signing an online informed consent to their voluntary participation in the study, each participant completed the questionnaires independently under the guidance of the investigator. The investigators needed to answer questions for participants based on uniform guidelines. The survey was anonymous, and data confidentiality was assured. All measures were written in simplified Chinese. This study was approved by the local Ethics Committee of West China Hospital of Sichuan University.

2.2. Measures

2.2.1. Short Grit Scale. The scale is a self-report instrument originally developed and validated by Duckworth and Quinn [11] to measure grit. It includes two subscales: consistency of interest (e.g., “New ideas and projects sometimes distract me from previous ones”) and perseverance of effort (e.g., “I finish whatever I begin”). Each subscale consists of four items, and participants were required to rate their agreement to each item on a five-point Likert scale ranging from 1 (not like me at all) to 5 (very much like me). The Chinese version of this scale was translated and validated by Li and colleagues (2018) using a back-translation process, which proved to have good reliability and validity among different populations [67–69]. All items in the consistency of interest subscale are negatively phrased, and the item responses are reverse-coded for scoring. A total score was obtained by summing the subscale scores, with higher total scores indicating a higher level of grit. Given that previous studies have demonstrated that the total score was a better predictor of personal success in the most demanding domains than either factor alone [11, 70], we focused on the total score in the current analyses. Cronbach’s α of this scale in this study was 0.75, indicating adequate internal reliability.

2.2.2. Task Performance Scale. We used the five-item Task Performance Scale for assessing in-role job performance [71, 72]. Participants were asked to indicate the extent to which they agreed or disagreed on a seven-point Likert scale (1 = “strongly disagree” to 7 = “strongly agree”) with the statements such as “I can always complete the duties specified in my job description.” Task performance is represented by summing the scores; the higher the score, the better the task performance. The scale showed acceptable psychometric properties in Chinese samples [67, 73]. In this study, Cronbach’s α was 0.96, indicating satisfactory internal reliability.

2.2.3. Multi-Dimensional Scale of Perceived Social Support. The scale was used to measure an individual’s perception of social support from various sources, i.e., significant others, family, and friends [74]. The scale consists of 12 items, e.g., “My family really tries to help me.” Participants rate their

agreement with each statement using a seven-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The scores from the items are summed to provide a total score for each dimension and an overall score for perceived social support. The scale has shown good reliability and validity in Chinese populations [58, 75]. As in previous studies [48, 76], the present study only focused on the overall score in the analyses. In the current study, Cronbach’s α of this scale was 0.94, indicating satisfactory internal reliability.

2.2.4. Rosenberg Self-esteem Scale. The scale was used to assess self-esteem [39], which consists of 10 items measuring an individual’s overall evaluation of himself/herself. Participants are asked to indicate their level of agreement or disagreement with each statement using a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). It includes items such as “I am able to do things as well as most other people.” Total scores can range from 10 (lowest self-esteem) to 40 (highest self-esteem). The scale has good reliability and validity in Chinese populations [56, 77]. In this study, Cronbach’s α was 0.88, indicating adequate internal reliability.

2.2.5. Big Five Inventory. To exclude the potential effects of general personalities on the associations among grit, perceived social support, self-esteem, and job performance, we used a 44-item Big Five Inventory to evaluate the personality traits including openness, agreeableness, conscientiousness, extraversion, and neuroticism [78]. Each item is assessed on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale has been translated and validated across different countries and cultures [79, 80]. The Chinese version has demonstrated adequate reliability and validity [79, 81]. In this study, Cronbach’s α s of the five dimensions were 0.78 (openness), 0.72 (agreeableness), 0.80 (conscientiousness), 0.72 (extraversion), and 0.78 (neuroticism), indicating adequate internal reliability.

2.3. Data Analysis. All behavioral data were analyzed using the statistical software SPSS 25.0 (SPSS Inc., Chicago, IL, USA). There are no missing data due to the settings of the web-based survey. First, to examine the effect of common method deviation that may arise from the measurement method regarding self-reported scales and can lead to inaccurate results [82, 83], Harman’s single-factor tests were conducted on all items of the four scales [84]. The participants’ sociodemographic characteristics and major variables were analyzed as descriptive statistics (i.e., mean and standard deviation (SD)). Pearson correlation analyses were performed to investigate the bivariate correlations among the measurements.

To test the mediating effects of perceived social support and self-esteem in the relationship between nurses’ grit and job performance, we used a bias-corrected bootstrapping method with PROCESS macro implemented in SPSS [85]. Mode 6 was chosen for the serial mediation analysis. We

tested our hypothesized chain mediation model in which grit (X) increases perceived social support ($M1$), which affects self-esteem ($M2$), which in turn leads to higher job performance (Y), while controlling for sex, age, education, professional title, marital status, and working years (as well as Big-Five factors). Bias-corrected confidence intervals for the indirect effect were calculated using 5,000 bootstrapped samples. This analysis also tests each mediator separately to assess the contribution of the simple mediations to the indirect effect on the relationship between X and Y . An empirical 95% confidence interval that did not contain 0 signified that the mediating effect was statistically significant [86].

3. Results

3.1. Common Method Bias. The results indicated that there were seven eigenvalues whose values exceeded 1 and the variance explained by the first eigenvalue was 33.37% (<40%), indicating that this study did not suffer from serious methodology bias [84].

3.2. Descriptive Statistics and Correlation Analysis. Table 1 presents the frequency/percentage or mean, SD, and range for sociodemographic characteristics. Most of the participants were females (643 females, 90.7%), and the average age for all participants was 31.74 ± 7.38 years old. 398 nurses (56.1%) had a bachelor's degree; 483 nurses (68.1%) were married; 366 nurses (51.6%) had a primary title; and the average total work experience was 10.67 ± 8.12 years.

Descriptive statistics and bivariate correlations for all measurements are shown in Table 2. As expected, higher grit was positively associated with higher perceived social support, self-esteem, and job performance ($ps < 0.001$). Perceived social support, self-esteem, and job performance were also intercorrelated ($ps < 0.001$). Moreover, grit was associated with all Big Five personality traits ($ps < 0.001$).

3.3. Chain Mediation Model Analysis. A serial mediation analysis was conducted to test the effect of perceived social support and self-esteem as multiple sequential mediators in the indirect relationship between grit and job performance in nurses via Model 6 in SPSS macro. Grit and job performance were entered as the independent (X) and dependent (Y) variables, respectively; perceived social support ($M1$) and self-esteem ($M2$) were added as mediators; sex, age, education, professional title, marital status, and working years were included as covariates.

As shown in Table 3 and Figure 1, the total effect of grit on job performance ($\beta = 0.39$, $p < 0.001$) decreased when the mediators were included in the model ($\beta = 0.14$, $p < 0.001$), suggesting that the effect of grit on job performance was partially mediated by perceived social support and self-esteem. Bootstrap estimation procedure ($n = 5000$) indicated that the indirect effects for this model were statistically significant (indirect effects = 0.55, $SE = 0.03$, 95% CI = [0.21, 0.31], accounting for 64.1% of the total variance; Table 3). The indirect effects were generated through three

TABLE 1: Sociodemographic characteristics of the participants.

Variable	Mean \pm SD (range) N%
Sex	
Female	643 (90.7%)
Male	66 (9.3%)
Age (years)	31.74 \pm 7.38 (18–55)
Educational level	
Graduate degree	4 (0.6%)
Bachelor degree	398 (56.1%)
College degree	270 (38.1%)
Secondary vocational degree	37 (5.2%)
Marital status	
Married	483 (68.1%)
Unmarried	198 (27.9%)
Divorced	26 (3.7%)
Widowed	2 (0.3%)
Professional title	
Vice senior	10 (1.4%)
Intermediate	170 (24.0%)
Primary	366 (51.6%)
None	163 (23.0%)
Length of nursing work (years)	10.67 \pm 8.12 (1–39)

Note. N, number; SD, standard deviation.

paths: Path 1 consisting of grit \rightarrow perceived social support \rightarrow job performance (indirect effect = 0.09, 95% CI = [0.05, 0.14]), Path 2 consisting of grit \rightarrow self-esteem \rightarrow job performance (indirect effect = 0.11, 95% CI = [0.07, 0.15]), and Path 3 consisting of grit \rightarrow perceived social support \rightarrow self-esteem \rightarrow job performance (indirect effect = 0.05, 95% CI = [0.03, 0.07]), which were all statistically significant. Hence, there is a chain mediation of social support and self-esteem as well as separate mediating effects of each on the relationship between grit and job performance in nurses.

3.4. Specificity of Findings. To test the specificity of the findings, we furthermore added Big Five personality traits, i.e., openness, agreeableness, conscientiousness, extraversion, and neuroticism, as additional controlling variables in the serial mediation model. The analysis yielded robust results (see Supplementary Information: Table S2 and Figure S1).

4. Discussion

In the present study, we investigated the relationship between grit and job performance in a sample of Chinese nurses during the COVID-19 pandemic, as well as the mediating role that perceived social support and self-esteem played in this relationship. The results revealed that grit not only directly influenced job performance but indirectly affected job performance through perceived social support and self-esteem separately and sequentially, and these findings were independent of Big Five personalities, all of which may provide an insightful understanding of underlying mechanisms that explain the influence of grit on job performance.

The positive relationship between grit and job performance found in the current sample is consistent with the

TABLE 2: Descriptive statistics and bivariate correlations of study measures.

Measure	Mean \pm SD	Range	1	2	3	4	5	6	7	8
1. Grit	27.03 \pm 4.14	17–40	—							
2. Perceived social support	66.23 \pm 10.69	21–84	0.41	—						
3. Self-esteem	31.03 \pm 4.30	16–40	0.50	0.53	—					
4. Job performance	29.20 \pm 4.21	5–35	0.40	0.46	0.52	—				
5. Extraversion	25.16 \pm 4.19	11–37	0.31	0.31	0.37	0.17	—			
6. Agreeableness	35.34 \pm 3.94	22–45	0.43	0.46	0.46	0.36	0.21	—		
7. Conscientiousness	32.92 \pm 4.60	14–45	0.56	0.28	0.50	0.39	0.30	0.49	—	
8. Neuroticism	22.94 \pm 4.83	9–39	−0.45	−0.36	−0.45	−0.25	−0.45	−0.46	−0.49	—
9. Openness	32.10 \pm 4.86	19–48	0.39	0.33	0.35	0.27	0.42	0.28	0.35	−0.36

Note. All correlation coefficients were statistically significant at the $p < 0.001$ level. SD, standard deviation.

TABLE 3: Total, direct, and indirect effects of the mediation model.

Effect	Effect size	Bootstrap SE	Bootstrap 95% CI
Total effect (grit \rightarrow job performance)	0.39	0.03	[0.33, 0.47]
Direct effect (grit \rightarrow job performance)	0.14	0.04	[0.07, 0.21]
Indirect effect	0.25	0.03	[0.21, 0.31]
Grit \rightarrow perceived social support \rightarrow job performance	0.09	0.02	[0.05, 0.14]
Grit \rightarrow self-esteem \rightarrow job performance	0.11	0.02	[0.07, 0.15]
Grit \rightarrow perceived social support \rightarrow self-esteem \rightarrow job performance	0.05	0.01	[0.03, 0.07]

Note. SE, standard error; CI, confidence interval. Sex, age, education, professional title, marital status, and working years were treated as covariates in the model.

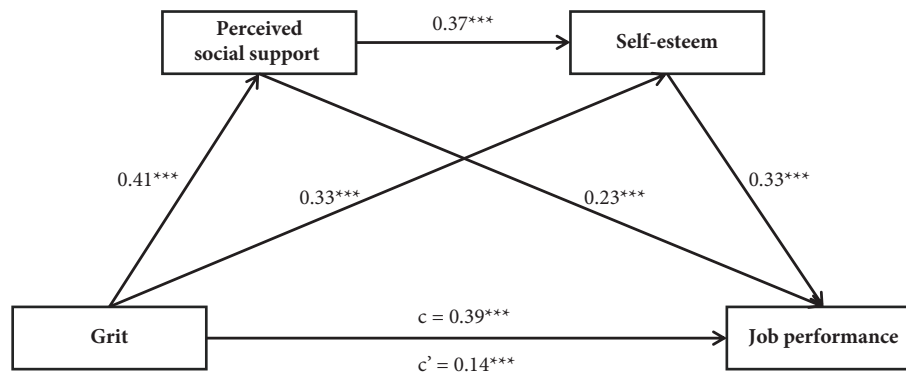


FIGURE 1: Model of the mediation role of perceived social support and self-esteem in the relationship between grit and job performance. Standardized regression coefficients were displayed in the path diagram; c , total effect; c' , direct effect; *** $p < 0.001$, ** $p < 0.01$. Sex, age, education, professional title, marital status, and working years were treated as covariates in the model.

findings of previous studies on this relationship [18, 19, 60]. Particularly, the present study verified this association in a large population of Chinese nurses during the pandemic even after controlling for the effects of Big Five personality traits, which extends the generalizability, specificity, and ecological validity of previous findings on this link. This finding agrees with the well-established COR theory, which proposes that grit is one of the personal resources linked to work goal progress [14, 24]. Prior research has shown that grit is associated with less burnout in healthcare professionals and students [87, 88], which facilitates long-term work and stability of nursing staff [88]. The increased job demands (e.g., surges in patient volume) during the pandemic led to healthcare professionals' burnout and exhaustion [2], which is found to impact objective and subjective work performance in nurses [89]. High levels of

grit may protect nurses from burnout and persevere through challenges [90] and therefore affect nursing job performance. Notably, the grit-job performance association was independent of Big Five personality traits, which supports the specificity of the current findings. Big Five traits have long been found to predict success and achievements [11, 78, 91]. In particular, Big Five conscientiousness is strongly correlated with grit and is a robust predictor of job performance [11, 62], yet Grit-S predicts achievement outcomes over and beyond conscientiousness and other Big Five traits [10, 11, 48, 92], which aligns with the present finding. Our study provided further evidence that grit captures a unique aspect of perseverance and passion that is distinct from the traditional personality dimensions, which appears to specifically predict job performance in nursing contexts. Nevertheless, based on the too-much-of-a-good-

thing (TMGT) framework in management proposed by Pierce and Aguinis [93], the beneficial role of psychological resources (e.g., grit) may be reversed into a negative factor of performance when grit is at a very high level; thus, future studies are needed to test the curvilinear relationship between grit and nurses' job performance [24].

The finding that perceived social support and self-esteem separately mediate the relationship between grit and job performance in nurses supports the JD-R model and COR theory. According to the JD-R model, social support is a type of job resource and grit and self-esteem can be deemed as personal resources that ultimately improve the job performance of working people [33], and external supports supplement internal motivation to increase their ability to perform well in their jobs. Hobfoll's [14] COR theory posits that people tend to acquire, maintain, and avoid losses of valuable resources, including objects (e.g., food), environmental conditions (e.g., interpersonal relationships), personal characteristics (e.g., grit and self-esteem), and energies (e.g., time) that serve as means for goal attainment. The COR theory further integrates the impact of perceived social support as a moderator of the relationship between grit and goal progress [24]. Research shows that gritty nurses can improve their meaning in life through perceived social support [29]. It may be that social support provides emotional assistance to help gritty individuals cope with workplace stress and adversity as they continue to pursue long-term goals, which is conducive to maintaining their performance levels. In particular, gritty nurses tend to feel a high level of social support because they use more positive coping strategies to deal with stress such as seeking and appreciating social support [94], which may enhance their perceived social support. Consequently, nurses with a high level of perceived social support are less likely to experience burnout and more likely to have increased overall well-being, which can lead to improved job performance as they are better able to engage in their work even during the pandemic [30, 95]. On the other hand, self-esteem, as a core self-evaluation trait, has been demonstrated to show the highest correlation with job performance as compared to other core traits [37] and is also positively related to grit [40, 43, 96]. Prior research has found self-esteem as a mediator in the link between grit and employees' life satisfaction [47]. The current study extends previous studies by revealing an indirect effect of grit on nurses' job performance through self-esteem. The mediating role of self-esteem in the grit-job performance relationship may be because gritty nurses may receive more positive feedback and reinforcement due to their persistence and passion, which can further enhance their self-esteem and encourage them to continue to achieve high job performance [48, 49].

The most important contribution of this study is elucidating the chain mediating effect of perceived social support and self-esteem on the relationship between grit and nurses' job performance. High levels of grit are associated with the perception of greater perceived social support, which in turn fosters higher self-esteem and ultimately improves nurse performance, highlighting the potential usefulness of social support as an external source and the

resulting self-esteem as a personal resource to improve job performance in gritty people. According to the sociometer theory [55], self-esteem is an internal measure to monitor one's interpersonal relationships and success. Feeling supported by others can contribute to individuals' overall sense of self-worth, value, and confidence in their abilities, whereas a lack of support from social relations makes individuals feel devalued and rejected [97], which can lead to negative self-evaluations and low self-esteem. Studies found that perceived organizational support can significantly increase nurses' self-esteem [53, 98]. Social support has long been recognized as an important coping strategy during times of crisis, and reduced social support is associated with nurses' burnout [4] and traumatic stress [99] during the COVID-19 pandemic. Thus, during a time full of stress and uncertainty, gritty nurses might actively seek and utilize their social support networks to maintain a high perception of social support, which can boost their self-esteem and in turn lead to better job performance during the pandemic.

5. Limitations of the Study

This study has some limitations. First, the study used a cross-sectional design which did not permit inference about the causality relations; thus, caution is needed to interpret the current finding, and the feasibility of the findings for use in nursing management warrants further investigation. Future studies may also test the mediating models using a longitudinal design tracking the changes of these variables over time to draw robust conclusions about causality [100]. Second, the data were collected only through self-report instruments. Although these questionnaires were selected for their good reliability and validity, self-report measures are vulnerable to biases, such as social desirability; future studies should incorporate more objective evaluations [101] and experimental tasks to precisely measure these variables. Third, the present study only measured perceived social support from family, friends, and significant others and did not assess perceived organizational support [98], which may play a particularly important role in the intensive work during the pandemic [102]. Fourth, this study only focused on Chinese nurses sampled from several local hospitals in Southwest China, and future studies need to expand the survey area (e.g., other regions of China or other countries) to improve the generalizability of the findings. Finally, previous neuroimaging studies have identified the neural substrates of grit [92, 103] and determined the neuroanatomical basis linking perceived social support to self-esteem [104], yet how these brain markers predict job performance remains uninvestigated; future studies are invited to explore the neural mechanisms underlying the associations among these variables in the framework of organizational cognitive neuroscience [105, 106].

6. Implications for Nursing Management

Our findings have critical implications for nursing management. The chain mediation provides new insights into enhancing grit to improve job performance. Specifically, at the organizational level, nursing managers should

implement personal education about the importance of grit in nurses, which can help them cope with stress and challenges when facing obstacles and difficulties at work. Second, it is necessary to provide unconditional organizational support to nurses and build support teams to expand their knowledge and skills as well as share their experiences and emotions, which may be an essential job resource that helps form positive feelings and evaluations of themselves [54] so as to increase their job performance. Moreover, psychological training programs aiming at fostering grit and self-esteem are suggested to be developed and adopted, which may also be conducive to nurses' job performance, especially during a crisis like the COVID-19 pandemic.

7. Conclusions

The current study investigated the association between grit and nurses' job performance during the COVID-19 pandemic and explored the chain mediation through perceived social support and self-esteem. The results showed that grit not only directly affects job performance but also has indirect effects through perceived social support and self-esteem, both independently and sequentially. These findings were not affected by Big Five personalities as well as sociodemographic characteristics, showing a specific nature to some degree. Our study has important implication for nursing management to improve nurses' job performance.

Data Availability

West China Hospital of Sichuan University has an institutional commitment to data sharing. To get access to the data and comply with the terms of our research ethics committee approval, an application to the corresponding author will be required, specifying the geographical extent of sharing.

Ethical Approval

This study involving human participants was approved by the local Ethics Committee of West China Hospital of Sichuan University (approval number: 2020HXBH092). All participants were asked to read and sign an online informed consent form before the study.

Disclosure

The funding sources had no involvement in the study design, data collection and analysis, results' interpretation, writing, or decision to publish the paper.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Supplementary 1. Table S1. STROBE Statement: Checklist of items that should be included in reports of cross-sectional studies. Supplementary 2. Table S2. Total, direct, and indirect effects of the mediation model. Supplementary 3. Figure S1. Model of the mediation role of perceived social support and self-esteem in the relationship between grit and job performance. (*Supplementary Materials*)

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Research Article

Impact of Individual and Job Characteristics on Nurses' Scope of Practice in Spanish Hospital Units

Amaia Saralegui-Gainza ^{1,2,3} Paula Escalada-Hernandez ^{1,3} Cristina García-Vivar ^{1,3}
Leticia San Martín-Rodríguez ^{1,3} and Nelia Soto-Ruiz ^{1,3}

¹Department of Health Sciences, Public University of Navarre (UPNA), Avda. Barañain s/n, Navarra, Pamplona 31008, Spain

²University Hospital of Navarra, C/Irunlarrea 3, Navarra, Pamplona 31008, Spain

³IdiSNA, Navarra Institute for Health Research, Irunlarrea, 3, Navarra, Pamplona 31008, Spain

Correspondence should be addressed to Leticia San Martín-Rodríguez; leticia.sanmartin@unavarra.es

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Background. Nurses are one of the largest and costliest groups in healthcare organizations; therefore, it is important to comprehend their scope of practice. **Aim.** To contribute to the improvement of nursing resource management in medical-surgical and Intensive Care Units by identifying factors that influence the scope of nursing practice. The hypothesis was that the activities carried out by nurses in medical-surgical units and intensive care units are influenced by individual and job-related factors, with job characteristics having an additive and moderating effect on individual characteristics. **Materials and Methods.** Cross-sectional correlational design to test the relationship between the individual and job characteristics on the nursing scope of practice measured by the Actual Scope of Nursing Practice (ASCOP) questionnaire. The sample consisted of 270 nurses. Linear mixed effects models analysis (LME) was used with the aleatory effect of the intensive care unit (ICU). **Results.** Belonging to the ICU decreased the scope of practice of nurses. We found a statistically significant effect of psychological demand, practice environment, role ambiguity, and growth need strength on the scope of nursing practice. The models explained a variance up to 24%. **Conclusions.** Although the survey results revealed the existence of broader scope of practice levels in Spanish hospital units than in the original Canadian study, the use of scope of nursing practice remains suboptimal. Higher levels on the psychological demand, the practice environment and in the individual growth need strength were related with a broader scope of practice. Otherwise, role ambiguity negatively affected the scope of practice. **Implications for Nursing Management.** This article provides an analysis of the impact of individual and job-related characteristics on the nursing scope of practice. It serves as a valuable resource for both managers and nurses, offering insights to improve nurses' working conditions and obtain more efficient workforces.

1. Introduction

In healthcare organizations, nursing human resources represent one of the most important groups because they are one of the largest and most expensive staff for healthcare services [1]. In addition, due to the current world situation, healthcare systems are facing a nursing staff shortage situation. There are insufficient numbers of nurses and that can directly impact patient outcomes [2]. McGahan et al. [3] have linked nursing human resources with a considerable improvement in patient outcomes, while it has been shown

that a higher nursing ratio or lower staffing levels may compromise patient safety [4] and their association with adverse events as well as mortality rates in medical and surgical inpatient care [5].

Numerous studies provide evidence of the significant impact of effective nursing management on healthcare organization outcomes and address the sustainability of nursing services, that it is "strongly influenced by the availability of productive nurses" [6]. Even though the lack of nurses is a serious problem in healthcare administration, it can be an ideal period to analyze the efficiency of nursing

human resources and the use of their full range of skills. Based on this analysis improvements in their work conditions may be proposed, and measures to ensure that they work as effectively as possible, and they provide continued and high-quality services can be adopted.

However, beyond the number of nurses working in each unit, it is important to consider the specific functions performed by these nurses. In this regard, a study developed by Gravling and Phoenix [7] confirmed that nurses stop performing nursing care while they carry out other tasks that are not within their competence. Therefore, it is imperative not only to examine coverage levels of nurses and their education qualifications in relation to the functions they are educated for and competent to carry out but also to analyze their specific functions and responsibilities, what is called "scope of nursing practice."

The "actual scope of practice" refers to the professional activities carried out in a setting by nurses, as opposed to those that are expected to be optimal [8]. According to White et al. [9], the optimal scope of nursing practice, which is associated with the nurse's education level, job title, and experience, differs from the actual scope of nursing practice, which is influenced primarily by organizational context and employer policies.

In the context of a study carried out in the United States, the recommended strategies to reduce the cost generated by nurses, same as those focused in the improvement of quality of care, should be designed to ensure that nurses allocate the required time to patients and reduce activities that do not add additional value [10]. Non-value-added care is the care that is either unimportant, potentially harmful, or could be performed at a similar cost by less-trained or less costly staff.

Furthermore, the study developed by Déry's et al. [8] concluded that different levels in the scope of practice can influence not only healthcare costs but also patient outcomes and the satisfaction of nurses. These authors developed the Actual Scope of Nursing Practice (ASCOP) model, which explains how individual and job characteristics have a direct impact on the functions performed by nurses and on their job satisfaction [11].

The model was developed defining linkages between factors influencing the scope of nursing practice, where the personal characteristics such as growth need strength, education level, experience level and autonomy, psychological demand, and role stressors as job characteristics [8]. The model has been further evolved and different updates have been published defining the different variables. The same researchers independently studied the influence of the level of education and they concluded that nurses with higher levels of education were found to be those who perform the more complex nursing activities, both those involving higher management skills and those involving more committed tasks such as staff supervision [12]. In addition to educational level, growth need strength was found to be significant in predicting scope of nursing practice, while job autonomy, psychological demands, and role stressors were also associated as predictor variables [13].

The authors' latest update was conducted at a mother-infant hospital in Quebec. It included the incorporation of

missed care and an analysis of organizational indicators [14]. Our proposal was to validate the same model in the Spanish population, so we considered including the variables used in the original framework. We did not include analysis of missed care, but we added some organizational factors, which we explain below.

Building upon the ASCOP model, the present study examined two new variables: nurses' evaluations of their practice environment and nurse-to-patient ratios. The practice environment consists of the organizational features of work that may facilitate or hinder nursing practice. This includes factors such as nurse-physician relationships, leadership and support for nurses, nurse involvement in hospital affairs, nursing's basis for quality care, and perceptions of resource provision and adequacy of resources [15]. On the other hand, nurses per patient ratio are a crude indicator of the nursing time available on a unit and refers to the number of patients nurses can care for simultaneously. The rationale for including these factors is based on their repercussion on both patients safety outcomes and the work factors of the nurses themselves. Numerous studies show that nurse staffing and the quality of nurses' work environment are associated with the quality of patient care. Hospitals with poor work environments present an increase of adverse outcomes but also lower levels of nurses' productivity [16]. Therefore, this variable, which not only impacts on patient outcomes, is particularly important in our study because of its direct influence on nurses' productivity, consequently affecting their scope of practice and their intention to leave their job [17].

When examining the factors that determine the scope of practice, the nurse-to-patient ratio was considered essential because, as Clarke argued, staffing levels directly affect the amount and quality of work that nurses are able to offer each patient [18]. Moreover, the same paper highlighted the relevance of studying the possible correlation between hospital work environment and staffing. Along the same line, Aiken et al. [19] have already worked on the implications of nurse staffing for recruitment, retention of nurses, and quality of care, suggesting that those job positions with better work environments were associated with a decrease in burnout and job dissatisfaction. This made the study of the working environment indispensable for our analysis. The framework for the current study is shown inside the die-cut box of Figure 1.

As shown in the area marked with the pointed box in Figure 1, our study focuses on how personal and work characteristics affect the scope of nursing practice, in addition to the effect that individual characteristics can have on work characteristics. In recent years, nursing managers are facing increasing difficulties in expanding nursing staff. This is due to a variety of factors, such as financial shortages, the underutilization of nurses, and the increasing cost generated by the new health needs of the population. Based on the above conceptual framework, our study seeks to find an approach that can guide nursing leaders to apply the necessary adjustments in nursing teams and to consider how to facilitate their working conditions to improve their productivity.

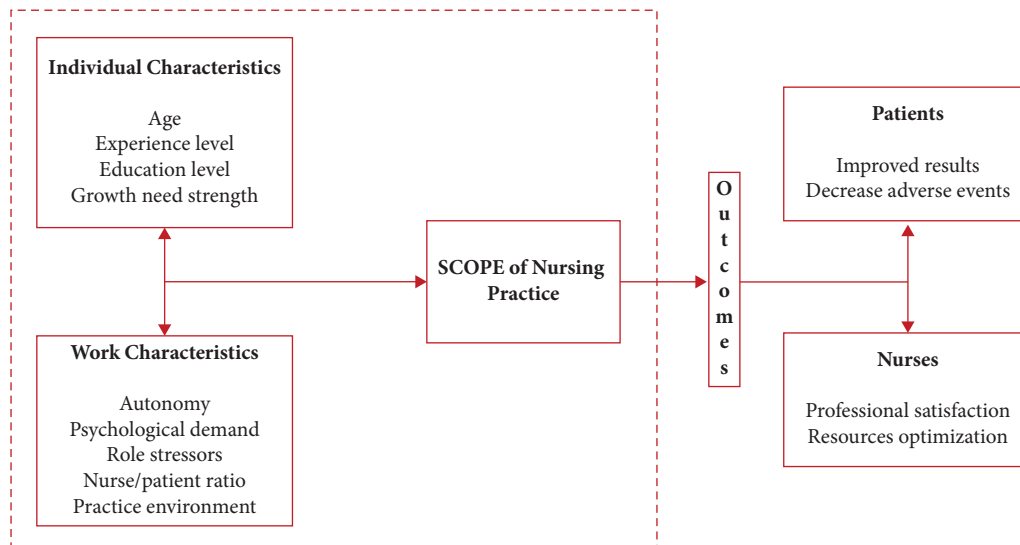


FIGURE 1: Redrawn conceptual framework based on ASCOP model [8].

Regarding the hospitalization units, where the study took place, it is worth mentioning the particularities of the ICUs for nurses working in these settings. Working in such a specialized environment like the ICU can be particularly stressful for the staff [20], and several studies have demonstrated a connection between ICU nurses and increased level of burnout [21].

Furthermore, it should be highlighted that the nature of nursing workforce in Spain differs from the characteristics of the professional structure in other countries. In the Spanish context, the access to jobs in the different health services or fields is the same for all registered nurses regardless of their level of training, except in special cases such as mental health nurses and midwives, which are not included in the study. The nurses working in the hospital hold a university degree to access the nurse jobs and maintain the same level of qualification throughout their careers, even as they pursue training through postgraduate, master's, and doctoral programs.

Considering the specific characteristics of nursing job in Spain, as well as the knowledge gap in this field, the main aim of this study is to contribute to the improvement of nursing resource management in medical-surgical and intensive care units by identifying factors that influence the scope of nursing practice.

Given the reasons described above and based on the following hypotheses, "the activities carried out by nurses in medical-surgical units and ICU are influenced by individual and job-related factors, with job characteristics having an additive and moderating effect on individual characteristics," these research questions motivated the study: Q1: "How do nurses' individual characteristics and the nature of their work affect their professional activities?" Q2: "Are the individual and job characteristics determinants of the scope nursing scope of practice?" Q3: "What is the relationship between the individual characteristics of nurses and the characteristics of their work? And how do these factors affect the activities they engage in within their profession?"

2. Materials and Methods

2.1. Design. A cross-sectional design [22] was used to test the relationship between the individual and job characteristics of the nurses and the outcome variable, nursing scope of practice.

2.2. Setting. This study was performed in 29 adult hospitalization units (24 general medical and surgical units and 5 intensive care units) of the 3 main public hospitals in a Spanish region of "Region blinded for review."

2.3. Sample. The following parameters were used to calculate the sample size: type I error of 0.05, type II error of 0.2 (power of 80%), and minimum detectable effect for a moderate intensity relation between the variables of interest 0.35. In addition, a 5% nonresponse rate was considered. The resulting size was penalized to contemplate the rest of the variables of the study, as suggested by Hsieh et al. [23], estimating a coefficient of determination for all of them of 0.32, according to the original study results [24]. Considering all these factors, a simple sample size of 270 subjects was calculated.

Convenience sampling was used. The total of 402 nurses working in clinical roles or in direct patient care were invited to participate in the study, and workers with less than 6 months of service at the institution were excluded. The first 270 nurses who responded to the questionnaire were chosen from among all eligible nurses.

2.4. Variables and Instruments. An online questionnaire was developed including the different measurement instruments to assess the study's variables of interest (Table 1).

The nursing scope of practice, or main variable, refers to the set of functions and responsibilities carried out by nurses, in relation to their competence and experience.

TABLE 1: Variables and the measurement instruments with their characteristics.

Variable	Questionnaire	N. items	Scale (Likert)
Nursing scope of practice	ASCOP questionnaire [25]	20	1-6, "never" to "always"
Age, years of experience, education level, nurse-to-patient ratio, unit	Demographic questionnaire		
Growth need strength "would like"	Job diagnostic survey (2 subscales) [26]	11	4-10
"Job choice"		12	1-5
Autonomy and psychological demand	Job content questionnaire [27]	18	1-4, "strongly disagree" to "strongly agree"
Role ambiguity and role conflict	Role ambiguity scale [28]	14	1-7, "strongly disagree" to "strongly agree"
Role overload	Role overload questionnaire [29]	3	1-5, "strongly disagree" to "strongly agree"
Practice environment	Pes-NWI [30]	32	1-4, "strongly disagree" to "strongly agree"

It was measured with the ASCOP questionnaire [24], in its Spanish version [25]. The original questionnaire evaluates the frequency of activities carried out by nurses in six areas of practice: assessment and care planning, teaching of patients and families, communication and care coordination, integration and supervision of staff, quality of care, and patient safety and knowledge updating and utilization. The internal consistency of the original Canadian instrument showed Cronbach's alpha of 0.89 [24]. In this study, the Spanish adaptation of the ASCOP questionnaire was used, which includes 20 items and two main dimensions (Cronbach's alpha of 0.90 for the global score of the questionnaire and Cronbach's α of 0.875 for the first factor and 0.825 for the second) and was cross-culturally adapted following the Canadian version [25]. Regarding the definition of the characteristics of the scale, each item can be scored from 1 to 6, depending on the level of implementation of the scope of practice in each assumption, in relation to the frequency that nurses describe carrying out the activities of their responsibilities. In the case of answering 1, it would refer to this activity being performed "never," while in the case of performing it "always," it would be indicated with 6. The final score of the questionnaire results from the average of each of the questions. Therefore, a score of 3 or less would suggest that the development of the scope of practice is suboptimal. In the best scenario, the maximum score would be 6, and scores above 3 would indicate that nursing activities are being performed more frequently, so the scope of practice is being fully implemented. The two dimensions that constitute the cross-cultural adapted version in Spanish were used, as it was designed for this cultural context of this study.

The independent variables included individual and job characteristics.

Individual characteristics:

- (i) Age (in years).
- (ii) Experience level in the current department (in years).
- (iii) Education level (graduate or postgraduate).
- (iv) Growth need strength: It is a personal characteristic that explains the variability between employees with respect to the need for self-actualization, learning and personal development at work [31]. It was measured with the validated Spanish version of the Job Diagnostic Survey (JDS) using two of its dimensions [26]. Cronbach's alpha obtained acceptable values: 0.91 for the first dimension and 0.72 for the second. It is divided into two dimensions in which both offer different response options in which the individual chooses the characteristics he/she would value when choosing a job. The first dimension evaluates job characteristics that the worker appreciates or would like to have in his job. The second subscale offers two response options to the individual that represent two specific conditions of his job; in it, he has to answer which of the two he would prefer to choose. Both measure those

personal characteristics that allow assessing the need for self-development at work. A higher score on the scales means that the need for development at work is considered to be high.

Work characteristics.

- (i) Autonomy and Psychological Demand: It refers to the ability to choose how to do the job and participate in decisions, and the amount of intellectual demands at work. It was measured using two factors of the Job Content Questionnaire [32], translated and validated in Spanish by Escribà-Agüir et al. [27], one factor to measure the concept of psychological demand at work and another for the concept of autonomy. Cronbach's alpha was rated between 0.74 and 0.88, presenting good reliability.
- (ii) Role Stressors: Role ambiguity, role conflict, and role overload. Role ambiguity and role conflict are defined as the lack of clarity regarding responsibilities and the excess of demands on the worker [33]. On the other side, role overload is defined as a situation in which the demands on the worker are excessive [34]. Role ambiguity and role conflict were measured with the Spanish version Role Ambiguity Scale of Rizzo et al. [35]. The analysis supported the existence of a bi-factorial structure (role ambiguity factor and role conflict factor) that explained 56% of the variance and Cronbach's alpha displayed acceptable value of 0.91. The Spanish version of the National Institute of Occupational Safety and Hygiene [28] was used. For the role overload, we used the Role Overload Questionnaire, developed by Beehr et al. [36] using the Spanish adaptation of Acosta [29]. The internal consistency reliability for role overload was alpha >0.95 for all facets, demonstrating a high correlation of the items.
- (iii) Practice environment: It is defined by Lake et al. [15] as factors that allow nurses to practice to the full scope of clinical practice and deliver safe, quality care to patients. The Practice Environment Scale-Nursing Work Index (PES-NWI), which has been adapted to Spanish by Orts-Cortés et al. [30], was used. The questionnaire showed acceptable internal consistency with Cronbach's alpha between 0.71 and 0.84. The tool has been recommended for its good psychometric properties and ability to compare results between studies and across different countries [37]. It was used in one of the most significant studies in nursing management research, RN4CAST [38], and is also included as a screening indicator for hospital staffing effectiveness in the Joint Commission accreditation standards [39].
- (iv) Nurse-to-patient ratio: Described as the minimum number of nurses in charge of a specified number of patients. The variable was assessed with a single item asking about the number of patients assigned to them on the last shift [40].

- (v) Unit characteristics: Medical, medical-surgical, surgical, and belonging to ICU or not.

2.5. Data Collection. An online questionnaire was developed and conducted through the web platform SurveyMonkey®. Participants were recruited via e-mail with the help of nursing managers of each unit, who were responsible for sending the invitation to participate through the corporation mail address in order to preserve their privacy.

The message included information about the project, the consent for participating and the link to the online questionnaire. For maximizing the response rate, two personalized reminder e-mails were sent and the participation was incentivized with a lanyard as a gift, distributed anonymously after questionnaires returned by each unit nurses' managers [41].

The final survey, with 120 items, included 7 measuring instruments: five to measure job characteristics, one to measure individual characteristics, the demographic data questionnaire and the ASCOP questionnaire to measure the principal variable.

2.6. Data Analysis. Data synthesis and analyses were performed using R version 4.2.2. software. The sample was described using numbers and frequency for categorical variables and mean, standard deviation, minimum, and maximum for continuous variables. Before starting the multilevel analysis, the assumptions of normality of the distribution were examined. The assumptions on which multiple linear and logistic regression analyses are based were checked.

This study focuses on estimating the nursing scope of practice related to nurse's individual and work characteristics. LME [42] was used to determine the significance of the nurse's characteristics in relation to their scope of practice and to estimate the additional effect of the unit, ICU or not ICU. LME, or also called multilevel models or hierarchical models, are extensions of linear regression models that include random effects and correlated errors.

This statistical approach of hierarchical models with random effects assumes that subjects within the same unit type have internal consistency and a hierarchical structure, where individual nurses are nested within hospitalization units or ICU. In our model, the individual and work characteristics were included as fixed effects and a random intercept per nurse was included in the models to adjust for clustering of measurements within belonging or not to ICU.

The percentage of variance in care time explained by the mixed models (R^2) was estimated using the method described by LaHuis et al. [43]. We used R software version 4.3.1. [44] with the lme4 [45] package to perform linear mixed analysis. The level of significance was set as 0.05.

2.7. Ethical Considerations. One-time anonymous survey was performed. The objectives of the study were explained and participants gave free consent to their participation. The study obtained the approval from the Ethics Committee of the (blinded for review) Public University of Navarre (PI: 005/19).

3. Results

We obtained 310 questionnaires and selected the first 270 questionnaires completed entirely to the end by nurses working on hospitalization and ICU. The data imputation process was dismissed considering the potential impact on the analysis due to the substantial amount of missing data in each incomplete questionnaire (more than 90% of the items) and for avoiding significant biases. Furthermore, the literature suggests that the benefits of using imputation in cases of mixed-model analysis are not necessary [46]. The response rate was 67.16%, and although there is no consensus on the appropriate response rate [47] (Morton, 2012), mixed-model designs with higher response rates benefit more than larger sample sizes [48]. However, a recent meta-analysis found that a response rate of 67% is recommended for health sciences studies [49].

3.1. Description of the Variables. Following the conceptual framework of the study, we present the description of the variables. Concerning to the participants' individual characteristics, the nurses had an average age of 39.9 years ($SD = 9.3$), and the mean of years of nursing experience was 11.6 years ($SD = 8.6$). 18.75% ($n = 58$) of our sample had completed the basic nursing degree with any postgraduate degree, but 81.3% ($n = 252$) had only the nursing degree. About the last individual independent variable, measured by the growth need strength questionnaire, the mean of "would like" variable was 8.77 ($SD 1.01$) and the mean of "job choice" section 2.58 ($SD 0.36$). About the characteristics of each unit, 34.8% ($n = 94$) of the nurses worked on an intensive care unit, while 65.2% ($n = 176$) were assigned to hospital units. Otherwise, 23.3% ($n = 63$) worked at a medical unit, 18.9% ($n = 51$) at a surgical unit, and 57.8% ($n = 156$) in mixed medical-surgical unit. A total of 19 different hospitalization units constituted our sample. The first work characteristic, autonomy was 2.80 ($SD 0.30$), psychological demand obtained a mean of 3.05 ($SD 0.290$), role conflict and ambiguity averages were 2.76 ($SD 0.93$) and 3.50 ($SD 1.28$), and the mean for role overload was 3.15 ($SD 1.18$). The mean of nurse-to-patient ratio was 6.72 ($SD = 3.9$), and finally, the mean for the practice environment was 2.76 ($SD 0.39$). Higher scores were related to higher levels of each variable. Regarding the total mean scores of our principal variable, the scope of nursing practice obtained a mean average of 4.05 ($SD 0.72$) (Table 2).

3.2. Linear Mixed Effects Models. Random ICU effect was included. Belonging to the ICU decreased the scope of practice of nurses in 0.15. Aleatory effects of analyzed unit are shown in Figure 2.

The results of the LME analyses conducted with the confounding variables and with adjustment for the corresponding values. As shown in Table 3, the estimated random effects for nursing scope of practice were 0.605 for between-units variance.

TABLE 2: Descriptive statistics.

		Scale	Mean	SD	Observed range	
					Min	Max
Scope of nursing practice	Global score	1–6	4.05	0.72	2.19	5.88
	First dimension	1–6	4.41	0.83	2.20	6.00
	Second dimension	1–6	3.60	0.79	1.70	5.80
Individual characteristics	Age (years)		39.9	9.3	23	59
	Experience level		11.6	8.6	1	35
	Education	81.3%	$n = 252$	—	18.7%	$n = 58$
	Graduate/postgraduate					
	Growth need strength					
	“Would like” “Job choice”	4–10 1–5	8.77 2.58	1.01 0.36	5.09 1.58	10.00 3.67
Work characteristics	Autonomy	1–4	2.80	0.30	1.67	2.67
	Psychological demand	1–4	3.05	0.290	2.33	3.78
	Role ambiguity	1–7	2.76	0.93	1.00	7.00
	Role conflict	1–7	3.50	1.28	1.00	7.00
	Role overload	1–5	3.15	1.18	1.00	5.00
	Nurse to patient ratio		6.72	3.9	1.00	20.0
	Practice environment	1–4	2.76	0.39	1.72	3.66
	ICU/hospitalization	34.8%	$(n = 94)$	—	65.2%	$(n = 176)$

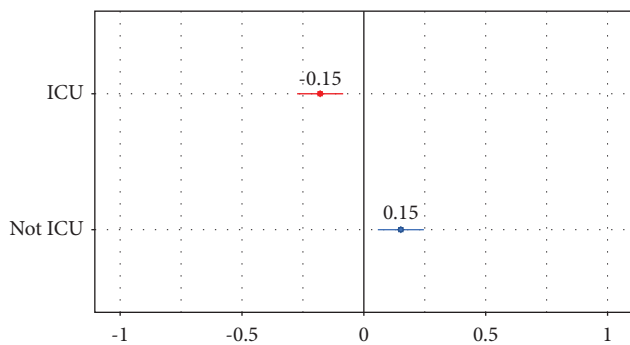


FIGURE 2: Estimated aleatory effects by ICU.

TABLE 3: Linear mixed effects models analysis, including random unit effect.

Parameter	Estimate	95% confidence level		p value
		Lower bound	Upper bound	
Scope of practice				
Intercept	0.605	-0.540	1.749	0.300
Psychological demand	0.561	0.284	0.838	<0.001
Practice environment	0.414	0.202	0.625	<0.001
Role ambiguity	-0.121	-0.207	0.035	0.005
Growth need strength	0.099	0.023	0.1761	0.010

We found a statistically significant effect of psychological demand (0.561, $p < 0.001$), practice environment (0.414, $p < 0.001$), role ambiguity (-0.121, $p = 0.005$), and growth need strength (0.099, $p = 0.010$) on scope of nursing practice. The models explained 24% of the variability within nurses' scope of practice (R_1^2 approx. 0.24). Fixed effects are presented in Figure 3.

All the variables were positively related with the nursing scope of practice except from role ambiguity, that demonstrated a negative trend, so that nurses who showed greater punctuation on those variables were related to a lower scope of practice (-0.12).

Otherwise, nurses with practice environment that multiplied the probability of having upper scope of practice by 0.41, and it occurred the same with the growth need strength that also predicted (0.10 times) the nursing scope of practice. Curiously, nurses with more role psychological demand had 0.56 times higher probability of developing their full scope of practice.

4. Discussion

This study examined the association of the individual and job characteristics on nursing scope of practice on hospital units. First, in this study, the scope of nursing practice (E-ASCOP 4.05) showed higher values than the original study (ASCOP 3.47) [24]. This difference may be explained, on the one hand, by the nature of unit in which the studies were carried out. The Canadian research was conducted in pediatric units, while in our case, we focused on hospital units. Country-specific differences in employment, the legislation and regulation of nursing practice and the level of training of nurses may be another key reason for these variations in scores. The result in our setting, scoring 4.05, shows that the frequency with which nurses performs tasks within their scope of practice is adequate but not optimal, still far from reaching the maximum ASCOP score of 6.

In the study of the nature of the scope of nursing practice, it is important to consider that while nurse work according to a framework of competencies set out in the ASCOP questionnaire, each hospital unit has its own particularities. Therefore, the activities carried out by nurses may differ between different inpatient units, including the ICU, as well as the working environment are conditioned

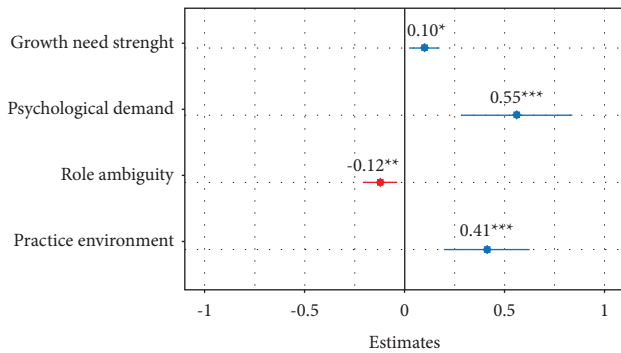


FIGURE 3: Fixed effects of LME. Significance levels are specified with *, **, and ***.

not only by job-related variables but also by the work colleagues themselves. This is why we chose this methodological approach, which considers the effect that belonging to the same unit may have. We consider that nurses working in the same unit will have similar characteristics. In this line, our results show that belonging to ICU decreases nurses scope of practice in 0.15.

Following the model generated in this study, the variables of psychological demand (0.56), practice environment (0.41), role ambiguity (−0.12), and growth need strength (0.10) were the most important characteristics in predicting the scope of nursing practice. The first of these variables is psychological demand, and as in the original study, each increase in this variable has a positive effect on the scope of practice. According to other authors, psychological demands at work are one of the main stress factors perceived by workers, but it has also been demonstrated that this stress can be attenuated by an enhancement of decision-making and a correct definition of specific functions [50]. Contrary to what might be expected, nurses with higher psychological demand are the ones who implement their scope of practice the most. Nurses with higher psychological demand often possess a strong intrinsic motivation and drive to excel in their profession. They are more likely to seek out opportunities for learning, skill enhancement, and career advancement. This motivation pushes them to actively pursue professional development and expand their scope of practice [51].

A second variable determined as a strong predictor of scope of practice in our study is the practice environment, showing a negative effect on the activities carried out by nurses. There are also studies that associate a poor work environment with missed care and negative patient outcomes [15]. It is also known that most of those nursing activities that are omitted are related to comfort activities and communication with patients [52]. Similar results were found in a Turkish research, demonstrating how the practice environment is related to work performance levels and how the staffing has a direct influence on the nurses' scope of practice [53]. It is worth to mention that practice environment, one of the two new variables included in our framework, was found to be a predictor of the scope of nursing practice, as supported by studies such as Pearson's [54] which analyzed the relationship between healthy practice environments and better patient outcomes.

With the addition of the nurse's practice environment as a job characteristic, we intend to develop a predictive model describing the relationship between that variable and the nursing scope of practice. The introduction of that variable was intended to include the more contextual and environmental factors or aspects of the job characteristics, not considered before this study. Understanding the relationship between the practice environment and nurses' scope of practice is essential for optimizing patient outcomes, enhancing job satisfaction, and ensuring the delivery of safe and efficient care [55].

In addition, the obtained results suggest that role ambiguity has a negative relationship with nurses' scope of practice. Tarrant [56] explained that the principal cause of role ambiguity is the inadequate definition of the role, and it has several impacts on job performance. It could be outlined in the following explanation: as a nurse's role is broader, she/he is responsible for more extensive competencies and consequently presents greater performance of the scope of practice. Ambiguity in job roles can hinder nurses' ability to effectively perform their scope of practice. When nurses are uncertain about their authority, decision-making capacity, or the scope/boundaries of their role, they might be hesitant to assume certain responsibilities or may not fully utilize their knowledge and skills. This can limit the extent to which nurses can contribute to patient care and highlight a weakness of nurse's workforce management [57].

Finally, our findings confirm that, among the individual characteristics analyzed, the growth need strength or need of personal self-fulfillment is related to the scope of nursing practice, in contrast to what was published by Fuertes et al. [26]. The intensity of growth need strength reflects the motivation of workers to perform their jobs and their capacity to adapt to change. In our case, the "would like" subscale obtained higher scores (between 71 and 100%), while the "job choice" subscale scored low, indicating that attention should be paid to the nurses' work system. Nurses with high growth need strength seek opportunities for learning, skill enhancement, and career advancement. When nurses' growth needs are met, they are more likely to actively seek out and embrace opportunities to expand their scope of practice. Conversely, if growth needs are not addressed, nurses may become disengaged and less motivated to pursue professional development, leading to a narrower scope of practice [58].

Our model explained 24% of the variance of nurses' scope of practice, compared to 32.5% of the ASCOP model developed by Déry et al. [8]. The Spanish ASCOP model demonstrated the significant influence of four variables on the scope of nursing practice: one variable concerning the individual characteristics of the nurses (growth need strength) and three of the variables referring to job characteristics (role ambiguity, psychological demand, practice environment). In our case, work characteristics were the most sensitive predictors of nursing scope of practice, in contrast to an Australian research [59] which used the Scope-q questionnaire and demonstrated the influence of demographic characteristics rather than work characteristics.

As a main difference compared to the previous model and considering the statistical analysis carried out in the Spanish context, our results do not include the educational level, autonomy, and role overload as predictors of nurses' scope of practice, in contrast with Déry's original study [8], where these variables were three of the five variables included in the model. This could be due to cultural differences, differences in the working conditions of Spanish nurses, and therefore, in their scope of practice.

To optimize nurses' scope of practice, healthcare organizations and leaders must consider these factors. Creating a practice environment that minimizes psychological demand, reduces role ambiguity, and promotes growth need fulfilment is essential. Strategies may include providing adequate support systems, clear role expectations, opportunities for professional development, and fostering a culture of collaboration and shared decision-making. In addition, addressing workload issues, promoting work-life balance, and implementing policies that support nurses' well-being can contribute to a positive practice environment that enhances nurses' scope of practice.

Using mixed effects models within nursing intensive care units, researchers may gain insights into the complex interplay between individual nurse characteristics, unit-level factors, and outcomes. This knowledge can inform evidence-based practices, healthcare policies, and strategies for improving nursing care within healthcare settings. Future research should continue to explore these dynamics to further inform interventions and practices that enhance nurses' scope of practice and consider job-specific differences.

The random effect of UCI is justified for multiple reasons. First of all, such specific care units may show different behaviors and contrary to what might appear, the scope of practice performed by their nurses is lower than in inpatient units. This may be due to technological advances and increasing care needs in recent years, the specific competencies of ICU nurses have been increasing [60]. This acquisition of new responsibilities may have compromised the work beyond their scope of practice and focused ICU nurses on more job-specific tasks, such as the care of specific devices and complex equipment. Secondly, it is well known that nurses working in ICUs are subjected to higher levels of stress. There are even studies that state that these nurses experience a change in their temperament after started working in ICU [61]. These data could lead us to think that belonging to this type of unit has effects not only on the characteristics of the job itself but also on the more personal attributes of these workers.

4.1. Limitations of the Study. One of the main limitations of this study was the elevated number of items (120) that the nurses had to answer. Despite being an easy to understand questionnaire, the response time was approximately 20 minutes, so there were several participants who started the questionnaire but did not complete it.

On the other hand, in our context, no significant differences were found, probably due to the low variability among nurses in their educational level, since in Spain, most nurses hold similar educational degrees (a three or four-year university degree). A line for future research could focus on comparing the scope of practice of nursing managers and general nurses, in which these differences could be studied, because more specialized educational qualifications have begun to be required for these roles.

Moreover, this is the first research in Spain to measure the scope of practice and its determinants. For future projects, a multicenter study could be considered to compare the different regions of Spain, assessing how the policies of each healthcare regional service affect both nurses' working conditions and the scope of their practice. In addition, it would be valuable to explore the particularity of the ICU, potentially needing a distinct study approach.

5. Conclusions

In this study, we have determined that there are individual and job characteristics that predict the scope of nursing practice in hospital units. Mixed effects models allow researchers to better understand the relationships between individual nurses and hospital units, providing valuable insights for nursing practice, healthcare management, and policy decisions. This new statistical approach complements the original analysis by including the random effect of belonging to a particular unit (ICU or medical-surgical unit) on nurses' scope of practice, which has not been previously considered. Nurses belonging to same unit had similarities and the results are different between those groups.

The scope of practice of Spanish hospitalization nurses demonstrated a broader range of practice than that of Canadian nurses. In the model we present, the influence of psychological demand, practice environment, role ambiguity, and growth need strength were the predictive variables of the nursing scope of practice.

Although the results showed better levels of scope of nursing practice than in the original study, it remains suboptimal. With the identification of the factors that are determinants, we can propose strategies to improve them and thus facilitate nurses to implement more broadly their scope of practice.

Data Availability

The mixed effects models data used to support the findings of this study are available from the corresponding author upon request.

Ethical Approval

This study has been approved by the Ethics Committee of the Public University of Navarre (PI: 005/19).

Consent

Written informed consent was obtained from the participants.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

The authors contributed equally to this study.

Acknowledgments

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Supplementary Materials

Completed STORBE checklist for observational studies [62]. (*Supplementary Materials*)

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Research Article

The Impact of Medical Explainable Artificial Intelligence on Nurses' Innovation Behaviour: A Structural Equation Modelling Approach

Xianmiao Li ¹, Qilin Zong ¹, and Mengting Cheng ²

¹School of Economics and Management, Anhui University of Science & Technology, Huainan, China

²School of Economics and Management, Nanjing University of Aeronautics and Astronautics, Nanjing, China

Correspondence should be addressed to Xianmiao Li; xianmiao@ust.edu.cn and Mengting Cheng; chengmengting1314@163.com

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Aim: This study aims to investigate the influence of medical explainable artificial intelligence (XAI) on the innovation behaviour of nurses, as well as explore the dual-pathway mediating effect of AI self-efficacy and AI anxiety and organizational ethical climate as the moderating effect.

Background: To address the practical application of medical AI technology, alleviate the scarcity of medical resources and fulfil the medical and health demands of the public, it is crucial to improve the innovation behaviour of nurses through the use of medical XAI.

Methods: A cross-sectional survey was conducted involving 368 Chinese nurses working at tertiary and secondary hospitals in Anhui Province, Jiangsu Province, Zhejiang Province and Shanghai.

Results: Implementing medical XAI significantly enhanced the innovation behaviour of nurses. Anxiety and self-efficacy regarding AI mediated the connection between medical XAI and the innovation behaviour of nurses. Furthermore, the organizational ethical climate positively moderated the relationship between medical XAI and AI self-efficacy.

Conclusion: Medical XAI helps to enhance nurses' AI self-efficacy and reduce AI anxiety, thereby enhancing nurses' innovation behaviour. An organizational ethical climate enhances the positive relationship between medical XAI and AI self-efficacy.

Implications for Nursing Management: Organizations and technology developers must augment the study about XAI and the system design of human-centred AI technology. The organizations aim to enhance the education and training of nurses in AI, specifically focussing on boosting nurses' self-efficacy in utilizing AI technology. Moreover, they want to alleviate nurses' fear of new technological advancements. Hospital administrators and leaders develop strategies to address the ethical atmosphere inside their organization.

Keywords: AI anxiety; AI self-efficacy; medical explainable artificial intelligence; nurses' innovation behaviour; organizational ethical climate

1. Introduction

Following numerous upgrades and reforms within China's medical sector, it is evident that the overall standard of healthcare has experienced notable enhancements [1, 2]. However, due to the imbalance in the supply and demand of nursing services, as well as the unreasonable allocation of medical resources, it becomes increasingly evident that the

current traditional nursing service system could not meet the nursing needs in China [3–6]. The emergence and development of medical artificial intelligence (AI) has led to breakthroughs in exploring new models of medical service [7, 8]. In China, ophthalmology and dentistry are the two departments with a high prevalence of medical AI technology [9, 10]. For example, the first AI eye centre for cataracts has been established in Guangzhou, China [11]. AI

is widely used in ophthalmology to assist in the diagnosis and therapeutic monitoring of ocular diseases such as diabetic retinopathy [12, 13], ocular tumours [14] and glaucoma [15]. AI is also widely used in dentistry to diagnose dental diseases such as caries and periapical inflammation [16, 17], formulate personalized treatment plans [18] and introduce dental implant robot [19], which improves the disadvantages of traditional oral diagnosis and treatment [20]. Nurses, as potential users of AI technology, are in a key position to shape and lead the development of modern AI in medical [21–23]. Nurses' innovation behaviour is beneficial to the popularization and application of medical AI technology, which could also drive the transformation and innovation of the nursing service in China [7, 8].

The concept of nurses' innovation behaviour pertains to the exploration and creation of novel technologies or methodologies to enhance health promotion, disease prevention and the quality of care [24, 25]. Labrague et al. [26] proposed the view that trainee nurses are willing to embrace technological advances and engage in innovation behaviour in nursing practice. To maximize the efficiency of medical AI in nursing, nurses contemplate methods to enhance or modify the implementation of medical AI in clinical and nursing practice [27, 28]. The barrier to nurses' involvement in AI research and collaborative design is a communication gap between nurses and technologists [29]. In addition, scholars have proposed that explainable artificial intelligence (XAI) should be conducted in light of the black-box nature to better understand the decision-making process of AI technology [30, 31]. The black-box property of AI technology refers to the fact that their decision-making processes and reasons are difficult to understand and explain [32]. Nurses must possess sufficient expertise in utilizing AI devices and effectively applying their knowledge in practice; however, an in-depth comprehension of the intricacies underlying the technology may not be a prerequisite [27, 33]. Thus, the explanation of AI should be modelled based on philosophy, psychology and the cognitive science of human interpretation [34] and cannot be explained solely through a technical perspective [35].

Arrieta et al. [36] proposed the concept of XAI from an audience perspective, which aims to make the decision-making and prediction processes within AI systems transparent and understandable. In the medical field, XAI has been defined as the extent to which nurses are able to understand the reasons for decisions made by AI systems [37, 38]. Furthermore, including medical personnel in developing and ultimately implementing healthcare AI technology can enhance their expertise rather than technology replacing them. This collaborative approach fosters a trustworthy relationship between medical professionals and technology, facilitating the advancement and widespread adoption of healthcare AI technology [27]. Researchers proposed to explore the XAI from the user's perspective in the technology development process to the application [30, 36, 39]. A limited number of studies exist investigating the potential impact of XAI on nurses' innovation behaviour [40].

According to the job demand–control model [41], medical AI technology changes nurses' work characteristics. It impacts their job requirements and control, affecting their psychological characteristics. Nurses with high self-efficacy have strong confidence and believe they can better cope with high job requirements, promoting innovation behaviour [8]. AI self-efficacy is defined as an individual's perception of their ability to use computers, rather than an individual's knowledge and understanding of computers [42, 43]. However, nurses with lower job control, to a large extent, have higher levels of stress and skill anxiety when their organizations implement new technology, refusing to use new technologies and avoid innovation behaviour. AI anxiety refers to the fear and anxiety that AI technology creates in individuals when it is beyond their control [7]. Social cognitive theory suggests that the environment influences individual cognition and behaviour [44]. The ethical climate of an organization is comprised of the collective knowledge and understanding of its members regarding what constitutes ethical conduct and how to resolve ethical dilemmas or problems [45], inevitably influencing the proactive behaviour and cognition of nurses [46–48].

This study explored the relationship between medical XAI and nurses' innovation behaviour, examining how AI self-efficacy and AI anxiety mediate this relationship. Additionally, the study investigated the moderating role of organizational ethical climate. By addressing these aspects, this research revealed how enhancing medical XAI can promote nurses' innovation behaviour, further advancing the integration of medical AI technology into nursing practice. It provided new insights for innovation in nursing management.

2. Research Hypothesis

2.1. XAI and Nurses' Innovation Behaviour. The present evaluation of medical XAI primarily evaluates the explainability of the model and application effect. The explainability takes accuracy, causality and stability as the measurement indicators, while the application takes the users' security, fairness and visualization as the evaluation indicators [49]. The essence of medical XAI is the interpretation of AI models developed from large amounts of intricate medical data [50] to make people understand how AI systems arrive at particular conclusions, recommendations and algorithms they rely on. Research has indicated that FATE (fairness, accountability, transparency and explainability) has a positive effect on the acceptance of algorithmic services, providing practical suggestions for the development of human-centred or responsible and trustworthy AI [51–53]. To measure XAI, the present study primarily adopts Shins' perspectives.

Nurses are likely to pay more attention to XAI, an important factor influencing the development and implementation of medical AI [28, 35, 54]. Social cognitive theory proposes that goals can elicit and direct motivational outcomes [55, 56]. Medical AI is highly explainable and can explain the foundation of its decisions, resulting in nurses' safety, responsibility and transparency, which improves

nurses' trust in medical AI technology [30, 57]. With improving the cognition and trust in medical AI technology, nurses may be willing to adopt and utilize medical AI technology in order to better achieve their goals and, to some extent, inspire innovation behaviour [26]. As an applied discipline, nursing actively promotes pursuing and delivering innovative medical services and emphasizes innovation as an opportunity to generate progress [58]. A lack of explainability in medical AI or algorithms hinders nurses' understanding and acceptance, diminishing their trust in such systems [54, 59]. Nurses adopt traditional diagnosis and treatment modes, avoid taking risks and do not actively innovate and explore new medical service methods.

Hypothesis 1. Medical XAI positively affects nurses' innovation behaviour.

2.2. Mediating Role of AI Self-Efficacy Between Medical XAI and Nurses' Innovation Behaviour. AI self-efficacy refers to an individual's belief in using AI technology to achieve work goals [60]. A high sense of self-efficacy implies that individuals can perform various tasks and job requirements effectively. Individual confidence leads to better performance and effectiveness of the AI technology, motivating the user to approach job challenges with greater initiative. According to the job demand-control model, the introduction of medical AI technology increases the job demands on nurses, which represent stressors in the work environment such as time pressure and excessive workload [61, 62]. Job control refers to an individual's ability to control work and tasks [63]. Job demand-control theory puts forward the buffering hypothesis that improving the sense of job control can reduce the negative impact of high job demands [64]. When medical XAI improves, it helps nurses' control and use medical AI to mitigate the negative effects of high work demands. Therefore, when nurses' sense of control over medical AI is enhanced, it helps to improve nurses' sense of AI self-efficacy. A high level of medical XAI inspires nurses to believe that AI can assist in the making of accurate and valuable auxiliary decisions, helps them gain confidence in AI technology for medical AI diagnosis and treatment and strengthens their trust in AI, which in turn improves their comprehension of novel technologies and knowledge, their conviction in task completion and their self-assurance.

Moreover, nurses with high self-efficacy are confident in their ability to solve challenges and foster innovation using AI technology [7, 8]. They are open to experimenting with novel approaches and technologies to deliver superior medical services and treatment to patients. Furthermore, nurses with high self-efficacy are eager to engage in continuous learning and technological innovation and seek opportunities to solve clinical practical problems such as diagnosis, treatment and AI technology improvement [65]. Therefore, medical XAI helps to improve the self-efficacy of nurses and ultimately promote their innovation.

Hypothesis 2. AI self-efficacy plays a mediating role between medical XAI and nurses' innovation behaviour.

2.3. Mediating Role of AI Anxiety Between Medical XAI and Nurses' Innovation Behaviour. AI anxiety refers to an individual's irrational anxiety and emotional response, leading to behaviour such as avoidance of use and reflecting their fear and unease about AI beyond their control [66]. According to the addictive strain hypothesis proposed in the job demand-control model, employees working in high job demand, low job control environments have the most negative mental health and the highest stress levels [61, 67]. Although AI technology is rapidly being used in the medical field for its high accuracy, high efficiency and noncontact treatment, for nurses who lack knowledge and understanding of AI technology, the introduction of medical AI technology can lead to a rise in nurses' job demand and a decrease in job control. Nurses' job stress arises from the imbalance between job demand and job control [8]. Individuals in long-term high pressure will cause anxiety and other bad health state [68]. Research showed that more information and knowledge about AI technology can help users reduce their anxiety when facing new technologies [35, 69]. Certain concerns can be alleviated by engaging in transparent discussions about the ethics of AI in healthcare [70]. Medical XAI has the potential to aid nurses in understanding the underlying logic behind judgements made by AI algorithm models, partially reducing their anxiety associated with AI.

The limited comprehension of AI technology among nurses will impact their concern regarding their skill and expertise in medical AI [71], thus affecting their motivation to participate in innovation and their level of innovation ability. Furthermore, AI anxiety also includes concerns about technology reliability, privacy and security. A lack of motivation and enthusiasm for innovation behaviour, scepticism and resistance to technological change and a reluctance to attempt new AI technology solutions or alter established work processes may result from numerous technical anxieties among nurses [72]. If nurses can overcome AI anxiety and actively respond to new work requirements, they can adapt and accept AI technology and believe that these technologies can provide better medical care. The promotion and widespread adoption of technology among nurses is contingent upon user-friendliness [73]. These technologies can relieve nurses of tedious tasks, freeing them to devote more time and energy to core nursing work and tasks that promote nursing innovation [35].

Hypothesis 3. AI anxiety plays a mediating role between medical XAI and nurses' innovation behaviour

2.4. The Moderating Role of Organizational Ethical Climate. Organizational ethical climate pertains to the collective knowledge and understanding of its members regarding moral dilemmas and influences individuals' attitudes, beliefs

and intentions towards moral issues. Furthermore, it profoundly impacts the ethical conduct and decision-making of the entire organization [74]. According to the social cognitive theory, individual activities are formed by interacting with three factors: individual cognitive characteristics, external environment and individual behaviour. Individuals will constantly regulate themselves by comparing their own behaviours with those advocated by the organizational ethical climate [55, 75]. The positive organizational ethical climate emphasizes the ability of nurses to provide a high level of medical care, as well as the ethical norms and professional principles that nurses should follow when making decisions [76–78]. An effective organizational ethical climate can give nurses access to resources and information by establishing medical XAI with principles of transparency, accountability, safety and fairness [52]. Adoption of medical AI helps nurses to provide a higher level of health care to their patients [79]. Therefore, in a positive organizational ethical climate, organizations prioritize the development of applications related to medical AI. Nurses are willing to continue to learn professional knowledge of AI technology to improve their awareness, application and innovation ability of medical AI [35, 80]. These nurses are optimistic about their ability to effectively implement medical AI technology to deliver successful diagnosis and treatment services. Consequently, a strong ethical climate within an organization enhances the positive correlation between medical XAI and nurses' AI self-efficacy.

Hypothesis 4. Organizational ethical climate has a moderating effect on medical XAI and AI self-efficacy.

Conversely, medical personnel may develop confidence in and endorse the management and organization due to a robust ethical climate within the institution [39, 46]. Nurses find it more manageable to comprehend the decisions and outcomes of medical AI when they have access to detailed information and relevant explanations about medical AI [72]. Social cognitive theory emphasizes the individual's observation of the environment and imitation [44]. Nurses observe colleagues beforehand when they are sceptical about their ability to use medical AI. Observing the colleague successfully use a medical AI to perform a job task can reduce the observer's anxiety [81]. In an organizational ethical climate, information transfer and communication mechanisms ensure that nurses understand the explainability of healthcare AI systems and reduce their AI anxiety by eliminating the sense of uncertainty surrounding their decisions. The strong organizational ethical climate weakens the negative relationship between medical XAI and AI anxiety. Theoretical model of this study is presented in Figure 1.

Hypothesis 5. Organizational ethical climate has a moderating effect on medical XAI and AI anxiety.

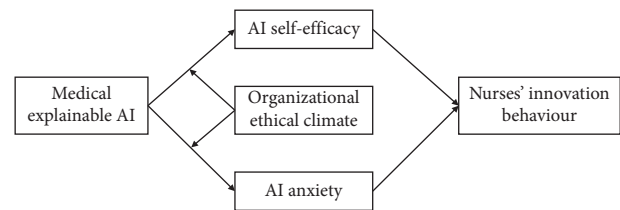


FIGURE 1: The hypothesized study model.

3. Research Methods

3.1. Sample and Procedure. This study focused on two departments (ophthalmology and dentistry), the frontier fields of AI technology application in China's medical field. Due to the convenience and variety of image data acquisition in these departments, they were transformed into research departments, with nurses serving as subjects of the investigations. This study was conducted from May 2023 to July 2023, with nurses from private hospitals and the top three hospitals in Anhui Province, Jiangsu Province, Zhejiang Province and Shanghai. The requirements of the respondents in this study were junior professional titles, intermediate professional titles and licenced assistant physician titles. They are working on healthcare related to medical AI and have worked in the department for at least 6 months.

Common method bias (CMB) refers to the perceived covariation between predictor variables and calibration variables due to the same data sources or the same raters, the same measurement environment, the context of the research and the characteristics of the items [82]. To prevent the effects of CMB, this study conducted a two-stage investigation [82], with a 2-month interval between the two surveys. The first stage of the survey began in May 2023. The respondents who completed the survey left the last four digits of their mobile phone numbers as matching codes. The distribution of 550 questionnaires resulted in the retention of 523 valid questionnaires after excluding incomplete and invalid questionnaires. In July 2023, questionnaires were disseminated to respondents who had completed the initial phase of the investigation. After eliminating unqualified and incomplete responses, the two questionnaires were compared. The recovery rate for the 368 valid questionnaires that were gathered was 66.91%.

3.2. Measurements. The questionnaire used in this study consists of three parts. The first part explains that the questionnaire was used for academic research only and that the participants in the study participated voluntarily and anonymously, with an undertaking to keep the questionnaire data safe and to safeguard the privacy of the participants. The second part deals with the demographic characteristics of the participants (age, gender, education and clinical experience). The third section deals with the

measurement of five variables, including medical XAI, AI self-efficacy, AI anxiety, organizational ethical climate and innovation behaviour. The variables were measured using reliable and mature scales developed. Likert's five-point scale was used, with one to five ranging from 'Strongly Disagree' to 'Strongly Agree'. For the initial scales that were in English, in order to minimize the impact of cultural and linguistic differences, a translation-back-translation method was used to convert the relevant scales into Chinese. In addition, the questionnaire items were appropriately adjusted according to the study context. Before formally distributing the questionnaires, three nurse leaders were asked to review the questionnaires to ensure that the internal logic of the questionnaires was smooth and the use of terminology was correct.

Medical XAI was adopted from the scale of explainable AI by Shin [51], including four items. The representative item was 'I found medical AI are easily understandable'. The scale's reliability coefficient was 0.73.

AI self-efficacy was adopted from the scale of robot use self-efficacy in healthcare work by Turja et al. [83], including six items. The representative item was 'I'm confident in my ability to learn how to use medical AI if they were to become part of my unit'. The scale's reliability coefficient was 0.84.

AI anxiety was measured from Huo et al. [7] four items. The representative item was 'With the large scale of medical AI application, I am concerned that medical staff lose control in the process of medical services'. The scale's reliability coefficient was 0.75.

Innovation behaviour was measured from Bao et al. [24] 10 items. The representative items were 'When working with medical AI, I will find the problems and be willing to solve them'. The reliability coefficient of the scale was 0.94.

Organizational ethical climate was measured from Vidaver-Cohen [84] five items. The representative item was 'The hospital where I work will require medical personnel to adhere strictly to relevant ethical guidelines when introducing new technologies such as medical artificial intelligence'. In this study, the scale's reliability coefficient was 0.87.

3.3. Ethical Consideration. In the survey, an informed consent letter was sent to participants, explicitly stating that their involvement in the study was both voluntary and anonymous. After completing the survey, the collected data were securely stored to ensure the confidentiality of the participants. Our research complied with ethical norms and laws. The Science and Technology Research Ethics Committee of Anhui University of Science and Technology approved the protocol of this study (Ethical ID: LW-2023-001).

3.4. Data Analysis. The data analysis was conducted using Amos 26.0 and SPSS 26.0. First, this study used the Harman one-way test by SPSS 26.0 to prevent CMB may cause serious confusion in the research results and potentially misleading the conclusions [82]. All items of the variables were subjected to unrotated factor analysis. If the first principal component explained less than 40% of the variance was obtained, it means that there is no significant CMB.

Second, the reliability and validity tests are an important condition to ensure the accuracy of the results of data analysis. Before hypothesis testing, this study needs to evaluate the reliability and validity of variable items. The reliability denotes the degree of internal consistency and stability of the measurement instrument, which is used to examine the reliability of variable measurements. The validity refers to the degree to which a test indicator can accurately measure the variable to be measured, that is, the accuracy of measurement results. It reveals the relationship between variables and measurement items.

Among them, the reliability test is usually evaluated by Cronbach's α coefficient. When Cronbach's α coefficient is higher than 0.7, the model has high internal consistency [85, 86]. Confirmatory factor analysis (CFA) is a common method to test the discriminative validity. In addition, in order to compare actual data and model fit to meet validation statistical criteria, enhancing the explanatory power and reliability of the assessment model, CFA methods can also be tested [87]. Commonly used validity indicators include $\chi^2/df \leq 3$, RMSEA ≤ 0.08 , CFI ≥ 0.90 , TLI ≥ 0.90 , NFI ≥ 0.90 and IFI ≥ 0.90 [88].

Further, Pearson was used to conduct a correlation analysis of the variables to test whether there is a multicollinearity problem between the variables in this study. When the correlation coefficient between variables exceeds 0.75, it is considered that the correlation between variables is high and there may be a multicollinearity problem [89, 90]. However, correlation analyses can only indicate whether there is a correlation between the variables and do not reveal the causal relationship between variables and the degree of its impact.

Finally, the hypotheses proposed, including main, mediating and moderating effects, are then tested when the reliability and validity of the measurement model meet the standard, and the data do not have serious CMB and multicollinearity problems.

4. Results

4.1. Demographic Characteristics. Table 1 presents the demographic characteristics of nurses, valid sample 368. Among them, the gender was female, accounting for 76.4%; most participants were less than 30 years old (82.6%), 71.7% had a bachelor's degree, 6.5% had a master's degree or above, 45.9% had less than 1 year of clinical experience, and 41.0% had 1–5 years of clinical experience.

4.2. CMB and CFA. Before commencing the investigation, this study implemented anonymity measures, including the hiding of variable names and the linguistic modification of questionnaire items, to minimize the influence of CMB. Nevertheless, it remained imperative to examine the potential bias. By employing Harman's single-factor test, we ascertained that the first common factor accounted for 37.39% of the variance in the total variables. This value is below the threshold of 40%, which signifies no obvious CMB in the research data.

TABLE 1: Nurse's characteristics ($N = 368$).

Variables	Frequency (f)	Percentage (%)
Gender		
Male	87	23.6
Female	281	76.4
Age		
20 or less	85	23.1
21–30	219	59.5
31 to 40	39	10.6
41 to 50	23	6.3
50 or higher	2	0.5
Education level		
High school	54	14.7
Junior college	26	7.1
University	264	71.7
Master and above	24	6.5
Clinical experience		
1 or less	169	45.9
1–5	151	41.0
6–10	39	10.6
11–20	6	1.6
21 or higher	3	0.8

In this study, CFA was used to examine the discriminant validity of the variables. Table 2 shows that the five-factor model had the best fit ($\chi^2/df = 2.548$, NFI = 0.902, IFI = 0.938, TLI = 0.923, CFI = 0.937, RMSEA = 0.065). All indexes were better than those of other models, indicating that the variables in this study had good discriminant validity.

4.3. Correlation Study. Table 3 shows the mean value, standard deviation and correlation among variables in this study. The data shown in Table 3 imply that medical XAI is positively correlated with AI self-efficacy ($r = 0.430$, $p < 0.01$), innovation behaviour ($r = 0.338$, $p < 0.01$) and negatively correlated with AI anxiety ($r = -0.262$, $p < 0.01$). AI self-efficacy was positively correlated with innovation behaviour ($r = 0.409$, $p < 0.01$), whereas AI anxiety was negatively correlated with innovation behaviour ($r = -0.321$, $p < 0.01$). These results provide a foundation for investigating the potential mediating effect of AI self-efficacy and AI anxiety on the relationship between medical XAI and nurses' innovation behaviour.

4.4. Hypothesis Test Results. Figure 2 presents the data after controlling for nurses' age, gender, education and clinical experience. Medical XAI positively impacts nurses' innovation behaviour ($\beta = 0.319$, $p < 0.001$), supporting Hypothesis 1. Furthermore, medical XAI had a positive impact on AI self-efficacy ($\beta = 0.406$, $p < 0.001$), and AI self-efficacy had a positive impact on nurses' innovation behaviour ($\beta = 0.317$, $p < 0.001$). Medical XAI had a negative effect on AI anxiety ($\beta = -0.240$, $p < 0.001$), and AI anxiety had a negative effect on nurses' innovation behaviour ($\beta = -0.154$, $p < 0.001$).

The bootstrap method was adopted to examine the mediating effect of AI self-efficacy and AI anxiety. Table 4 summarizes the results. Mediator Path 1 is medical

XAI \rightarrow AI self-efficacy \rightarrow innovation behaviour, which tested the mediating effect of AI self-efficacy on medical XAI and innovation behaviour. The indirect effect size was 0.093 with a 95% confidence interval [0.042, 0.146], excluding 0. The mediating effect of AI self-efficacy was significant, and Hypothesis 2 was verified. This result confirms that AI self-efficacy plays a significant mediating role in the relationship between medical XAI and innovation behaviour. This means that improving medical XAI can increase nurses' AI self-efficacy and thus promote innovation behaviour among nurses.

Similarly, Mediator Path 2 was medical XAI \rightarrow AI anxiety \rightarrow innovation behaviour, testing the mediating effect of AI anxiety between medical XAI and innovation behaviour. 95% confidence interval [0.003, 0.065], excluding 0, estimated the indirect effect size to be 0.031. The mediating effect of AI anxiety was found to be significant, confirming Hypothesis 3. This result confirms that AI anxiety plays a significant mediating role in the relationship between medical XAI and innovation behaviour. This means that it is possible to reduce nurses' AI anxiety and thus promote their innovation behaviour by improving medical XAI.

As shown in Figure 2, the interaction terms of medical XAI and organizational ethical climate had a significant positive effect on AI self-efficacy ($\beta = 0.088$, $p < 0.05$), assuming that Hypothesis 4 was verified. The interaction term of medical XAI and organizational ethical climate was not significantly related to AI anxiety ($\beta = -0.075$, n.s.), not supporting Hypothesis 5.

In addition, based on the simple slope method recommended by Aiken and West [91], this study conducts the interaction effect diagram of the interaction of medical XAI with organizational ethical climate on AI self-efficacy. Figure 3 shows that the positive effect of medical XAI on AI self-efficacy is higher when the organizational ethical climate is strong.

TABLE 2: Results of confirmatory factor analysis (CFA).

Model	Variables	χ^2/df	NFI	IFI	TLI	CFI	RMSEA
Five-model	XAI, AISE, AIA, IB, OEC	2.548	0.902	0.938	0.923	0.937	0.065
Four-model	XAI, AISE + AIA, IB, OEC	3.547	0.859	0.894	0.874	0.893	0.083
Three-model	XAI + OEC, AISE + AIA, IB	5.144	0.79	0.824	0.794	0.823	0.106
Two-model	XAI + OEC + AISE + AIA, IB	6.304	0.739	0.771	0.737	0.769	0.120
One-model	XAI + OEC + AISE + AIA + IB	9.468	0.605	0.631	0.580	0.629	0.152

Abbreviations: χ^2 , chi-square fit statistics; AIA, AI anxiety; AISE, AI self-efficacy; CFI, comparative fit index; df, degrees of freedom; IB, innovation behaviour; IFI, incremental fit indices; NFI, normed fit index; OEC, organizational ethical climate; RMSEA, root-mean-square error of approximation; TLI, Tucker–Lewis index; XAI, medical explainable artificial intelligence.

TABLE 3: Means, standard deviations and correlations among variables ($n = 368$).

	M	SD	1	2	3	4	5
1 XAI	3.627	0.737	0.722				
2 AISE	3.583	0.676	0.430**	0.756			
3 AIA	3.566	0.714	0.262**	0.471**	0.708		
4 IB	3.543	0.683	0.338**	0.409**	0.321**	0.781	
5 OEC	3.766	0.698	0.350**	0.582**	0.451**	0.401**	0.789

Note: The bold values indicate the average variance extracted (AVE) values.

Abbreviations: AIA, AI anxiety; AISE, AI self-efficacy; IB, innovation behaviour; M, mean; OEC, organizational ethical climate; SD, standard deviation; XAI, medical explainable artificial intelligence.

** $p < 0.01$.

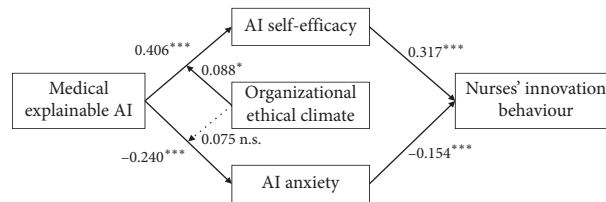


FIGURE 2: Structural equation model. Note: * $p < 0.05$; *** $p < 0.001$; n.s. means that the path is not significant.

5. Discussion

Based on job demand–control theory and social cognitive theory, this study explores the path mechanisms of medical XAI influencing nurses’ innovation behaviour and draws the following conclusions:

Medical XAI has a significant positive impact on nurses’ innovation behaviour, supporting H1. The application of medical AI technology is mainly divided into auxiliary diagnosis and treatment technology and independent diagnosis and treatment technology [7]. The use of medical AI technology, such as image acquisition and surgical assistance, improves diagnostic efficiency and accuracy, reduces the work pressure of nurses and makes the assistant AI technology updated and popularized [15]. However, for some AI robots to independently complete online diagnosis and answer questions, the explainability of the technical algorithms cannot yet be accepted or recognized, and nursing the actual work needs matching is low. The effect of the application is not very good. The two medical AI technologies have different levels of explainability, with the more explainable medical AI technology being more acceptable and trusted by nurses, so there are differences in technology promotion and innovation development. The result of this study provides an answer to why there is a certain degree of divergence between the innovation and

development of medical AI technology and why medical XAI promotes the innovation behaviour of nurses. That is, nursing managers should pay attention to the fact that medical XAI can influence nurses’ innovation behaviour in nursing practice.

This study suggests that there are two different path mechanisms for the influence of medical XAI on nurse innovation behaviour. Specifically, the first pathway is that AI self-efficacy mediates the relationship between medical XAI and nurse innovation behaviour, supporting H2. Shin [73] proposed that medical XAI would enhance nurses’ trust in AI technology and enhance nurses’ confidence and intrinsic motivation to improve innovation. The core of AI self-efficacy is the belief that individuals can effectively use AI to accomplish their work [92]. Nurses can enhance the practicality of medical AI technology and improve technological innovation by offering developers feedback regarding its safety, accountability, transparency and explainability [36] and promote technological innovation. When medical XAI is at a high level, nurses perceive medical AI as simple and easy to understand, increasing nurses’ confidence in utilizing medical AI and applying medical AI to solve problems in clinical practice. Because nurses believe they can overcome challenges and successfully apply these technologies. Nurses with high AI self-efficacy will hold a more open and inclusive attitude towards medical AI and

TABLE 4: Direct and indirect effects.

Dependent variables	Paths	Effect size	Standard error	95% confidence interval	
				Upper limit	Lower limit
Innovation behaviour	Total effect	0.296	0.046	0.205	0.386
	Direct effects	0.172	0.048	0.077	0.266
	Indirect effects	0.124	0.028	0.071	0.180
	Mediator Path 1: XAI → AI self-efficacy → innovation behaviour	0.093	0.027	0.042	0.146
	Mediator Path 2: XAI → AI anxiety → innovation behaviour	0.031	0.016	0.003	0.065

Abbreviation: XAI, medical explainable artificial intelligence.

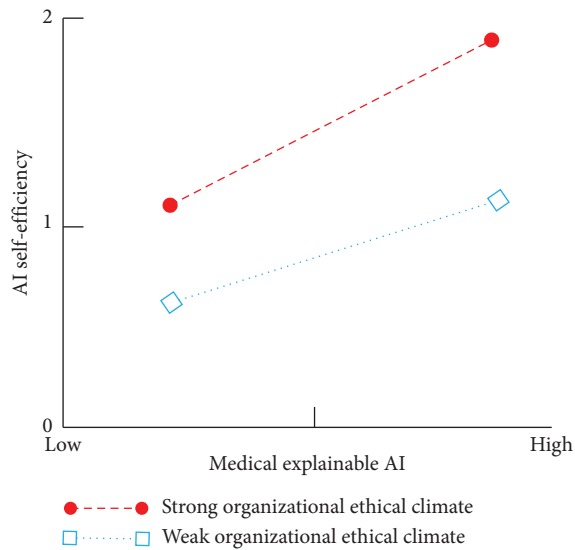


FIGURE 3: The moderating effect of organizational ethical climate on the relationship between medical XAI and AI self-efficacy.

are more willing to use the new technology to solve problems in clinical practice [43, 60, 92], thus promoting innovation behaviour.

The second pathway is that AI anxiety mediates the relationship between medical XAI and nurse innovation behaviour, supporting H3. According to the job demand–control model, the four combinations of job demand and job control affect employee creativity [93]. The combination of high job demand and low job control is more likely to lead to higher exhaustion and lower motivation [94]. It is challenging for nurses to identify these errors or biases due to the opacity of AI [95], which does not provide a foundation for overturning or correcting the decision. Low levels of medical XAI can become the job demand for nurses, especially when nurses are required to learn to utilize medical AI for more complex care tasks, putting nurses in a state of anxiety, which is consistent with a state of high job demand and low job control. Whereas anxiety as a poor mental leads to negative behaviour [96], it can reduce nurses' acceptance of medical AI as a new technology and they will be reluctant to engage in innovation behaviour related to medical AI. The results reveal that nurses can enhance their understanding of medical AI technology by learning relevant knowledge in medical XAI. This can increase self-efficacy in using medical AI technology and reduce AI anxiety, which help nurses make informed decisions in nursing practice. On the one hand, it promotes nurses' innovation behaviour, advancing the development and innovation of the nursing services industry. On the other hand, once nurses become proficient in medical AI technology, they can also assist developers in improving technology or algorithms, promoting the emergence of more advanced and user-friendly medical AI technology, thereby advancing nursing innovation and development. Additionally, the results also address the cognitive pathways explaining why medical AI technology has both positive and negative impacts [69, 97, 98].

Finally, the study introduced organizational ethical climate as a moderating variable. Organizational ethical climate positively moderated the relationship between medical XAI and AI self-efficacy, supporting H4. However, the moderating effect was not significant in the relationship between medical XAI and AI anxiety, not supporting H5. This may be because the application and promotion of medical AI technology are still developing, and nurses are not too worried about the technology. Social cognitive theory emphasizes the individual's observation of the environment and imitation [44]. Fairness, accountability and transparency will be emphasized in the positive ethical climate of the organization [99, 100]. This positive environment enhances the importance of medical AI in organizations and makes organizations inclined to introduce medical AI devices or technologies with high explainability. An organizational ethical climate can help nurses develop a correct understanding of medical AI technology, enabling them to rigorously monitor AI in nursing practice. Such behaviour aids in preventing individuals from evading medical responsibilities, enhancing trust in AI and reducing the negative impacts of new technologies. This study indicates that nursing management personnel can introduce the implementation of ethics education and training systems related to AI technology within organizations, leading to a significant improvement in nurses' AI self-efficacy. The organizational ethical climate as a moderating variable can resolve doubts for organizations about how and what to intervene. Establishing a positive organizational ethical climate can not only facilitate the integration of medical AI technology into nursing practice but also promote innovation in the nursing services and improve the patient care experience.

6. Conclusions

This study provides new insights into the factors that promote nurses' innovation behaviour. Overall, this study explored the dual-path model of the impact of medical XAI on nurses' innovation behaviour based on the job demand–control model and social cognitive theory, and this study examined how medical XAI affects nurses' innovation behaviour. It can be concluded that AI self-efficacy and AI anxiety mediated the relationship between medical XAI and nurses' innovation behaviour separately. As a moderating variable, organizational ethical climate moderates the effect of medical XAI on nurses' AI self-efficacy. The findings suggest that the explainability of medical AI in terms of fairness, accountability and transparency can be enhanced from the cross-disciplinary perspective of humanities and social sciences, which can provide new ideas for the development of medical AI technology and system design, and provide theoretical support for promoting and training nurses' innovation behaviour. In addition, strengthening the promotion and application of medical AI technology and enriching new nursing service models can provide new ideas for solving the problems of shortage of medical personnel and unequal distribution of medical resources.

6.1. Implications for Nursing Management. This study explores the relationship between medical XAI and the innovation behaviour of Chinese nurses, with practical implications for the nurse community, organizational managers, student nurse education schools and the field of medical AI. Details are shown as follows:

1. Cross-disciplinary collaboration is carried out to encourage nurses' participation in the medical AI design. There is a need to empower nurses to collaborate with technologists, doctors and other healthcare professionals to jointly develop and evaluate AI solutions. This interdisciplinary collaboration helps ensure the applicability of AI technology devices. For example, it is suggested that organizations and technology developers need to enhance the understanding and research of medical XAI from the perspective of humanities and social sciences for system design of human-centred medical AI technology. In healthcare, medical XAI is critical for nurses, patients and other stakeholders, who must understand how AI technology makes decisions and what data are used to make predictions or diagnoses [39, 73]. Organizations and technology developers need to prioritize the design of user-friendly interfaces that facilitate nurses' understanding of medical AI outcomes and decisions. We ensure that the decision-making process of the AI system is transparent, and establish feedback mechanisms so that nurses can report and discuss issues and challenges in practical use. Furthermore, it is crucial to establish traceability and reviewability mechanisms within the decision-making process of medical AI. This will enable healthcare workers to verify the reliability of the system's decisions and hold it accountable for the results that it produces. Enhancing the legitimacy and acceptability of medical AI technology is crucial for fostering its integration into clinical practice.
2. Enhance nurse education and training. Organizations or societies should provide ongoing education on medical AI technology to enable nurses to understand and utilize these tools, enhance nurses' self-efficacy and reduce nurses' anxiety and concerns about new technology. Training should include how to explain the AI decision-making process and effectively use these technologies in daily nursing practice such as encompassing fundamental information, practical applications, technical principles and operational procedures about medical AI. Training programs effectively enhance nurses' comprehension of the potential and prospects of medical AI [29, 101]. These programs also equip nurses with the necessary skills and knowledge to effectively utilize AI technology [26]. Organizations can utilize practical scenarios to facilitate nurses' understanding and recognition of the practical implications of AI technology and bolster their confidence in and self-assurance regarding using such technology. Nurses can better adapt and utilize

medical AI technology and reduce anxiety with continuous support and guidance from relevant medical organizations.

3. The ethical issues of medical AI should be paid attention to, and a positive organizational ethical climate should be established. The organizations strengthen research on medical AI ethics and set up a special research institute or ethics committee responsible for researching and regulating issues related to medical AI ethics. These institutions may comprise professionals and academics with diverse areas of expertise, including but not limited to medicine, ethics, law and computer science. They engage in interdisciplinary collaboration to incorporate various perspectives and interests, aiming to offer more efficient resolutions for ethical dilemmas in research and response [34, 102]. It is essential to develop a framework and guiding principles for ethical issues in medical AI through research and discussion, which can cover data use, algorithmic fairness, transparency, privacy protection, accountability and other aspects of medical AI technology to guide the development, application and regulation of medical AI technology. The organizations establish contact with international partners to share experiences and research results. Countries and regions may have different concerns and research on the ethical issues of medical AI [98]. By fostering international collaboration, we can advance global cooperation in investigating and resolving ethical concerns associated with medical AI and gain knowledge from one another [103, 104].

6.2. Limitations. The present study has some limitations. First, the study focused on dental and ophthalmology nurses as the research participants and did not specifically address the impact of medical AI implementation and promotion across various departments. To address this limitation, future research could investigate the different departments of nurses using healthcare AI as a way to improve the representativeness of the data and the generalizability of the findings. Second, Huo et al. [105] have categorized medical AI into auxiliary and autonomous technologies based on the classification of its applications. Subsequent research endeavours may explore the varying effects of different types of medical AI on nurses' innovation behaviour. Third, the research employed solely a questionnaire survey as the data collection method, which poses limitations in obtaining comprehensive feedback from nurses regarding the actual implementation of medical AI. To address this limitation, future investigations may explore using case studies and experimental methods in the later stages of the study.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics Statement

The Science and Technology Research Ethics Committee of Anhui University of Science and Technology approved the protocol of this study (Ethical ID: LW-2023-001).

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

Xianmiao Li conceptualized and visualized this study, performed formal analysis and data curation, wrote the original draft and reviewed and edited the manuscript. Qilin Zong conceptualized the study, performed formal analysis and data curation and reviewed and edited the manuscript. Mengting Cheng investigated the study, curated the data and wrote the original draft. All authors have contributed to the final version of the manuscript. Additionally, each author had provided final approval of the version to be published.

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Research Article

Impact of Nursing Professional Values on Depression, Stress, and Anxiety among Nurses during the COVID-19 Pandemic

Alberto Lana,^{1,2} Beatriz Sánchez-García,¹ María González-García,^{2,3}
Ana Fernández-Feito ,^{1,2} and David González-Pando^{2,3}

¹Department of Medicine, University of Oviedo, Avda Julián Clavería s.n, Oviedo 33006, Spain

²Healthcare Research Area, Health Research Institute of Asturias (ISPA), Av. Roma, s.n, Oviedo 33011, Spain

³School of Nursing of Gijón, University of Oviedo, Camino de los Prados, 394, Gijón 33203, Spain

Correspondence should be addressed to Ana Fernández-Feito; fernandezfana@uniovi.es

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Aim. The aim was to explore the association between nursing professional values (NPV) and mental health among registered nurses (RN) in Spain. **Background.** Nursing is a profession rooted in strong professional values, which guide and shape clinical practice and occupational behaviors. NPV should serve as a source of support in situations of great uncertainty. **Methods.** A cross-sectional study was conducted during the remission phase of the second wave of the COVID-19 pandemic (December 2020–January 2021) among a sample of Spanish RN ($n = 420$). NPV were assessed using the Nursing Professional Values Scale (NPVS-R), comprising 26 items grouped into five factors: caring, activism, trust, professionalism, and justice. Perceived stress, anxiety, and depression were measured by the Perceived Stress Scale (PSS-14) and the Hospital Anxiety and Depression Scale (HADS). Adjusted linear regressions were used to estimate b coefficients for the associations between NPV scores and the three mental health indicators. **Results.** The fully-adjusted analysis, including sociodemographic and occupational variables, revealed that higher activism scores were associated with higher scores of stress (b coefficient: 0.46; 95% confidence interval: 0.03–0.88; p value: 0.035), anxiety (0.24; 0.05–0.43; 0.014), and depression (0.19; 0.01–0.36; 0.035). No other NPV was associated with mental health. **Conclusion.** Organizational policies and programs should be established to protect the most activist RNs and to mitigate the potential detrimental effect of activism on mental health at times and/or circumstances of high workloads and personal stress.

1. Introduction

Nurses are one of the occupational groups that present the highest risk of suffering from mental health distress. Contact with illness and suffering, together with working under the clinical uncertainty of most processes, are inexhaustible sources of psychological stressors, emerging from the nature of care itself. The most prevalent mental health issues suffered by nurses are compassion fatigue and burnout [1, 2], which are in turn associated with anxiety and depression [3, 4]. A meta-analysis of 79 studies involving 28,509 nurses from 11 countries found moderate levels of compassion fatigue, which has increased gradually worldwide over the last decades [2]. Another meta-analysis of 61 studies involving 45,539 nurses from 49 countries found an overall

pooled prevalence of burnout of 11.2% among nurses globally [5].

In addition, the physical and psychological stress of providing care in complex occupational environments means that nurses are even more vulnerable to mental health problems. Certain situations and characteristics of the work environment may reduce the mental well-being of nurses, which compromises the quality of care [6]. Work overload, work shifts, high staff turnover, difficulty in reconciling work and private life, or the type of unit are some of the most evident contributing factors [7]. These contributors can trigger physical exhaustion, sleep disorders, headache, osteoarticular pain, difficulty concentrating, and memory losses, among other symptoms, resulting in job withdrawal due to sick leave, absenteeism, and intention to leave [5, 8].

Furthermore, other less-visible characteristics of the nursing profession confer nurses with a greater propensity for mental distress. First, the mismatch between nurses' expectations and the nonideal reality of nursing care (i.e., conflict between vocation and role) [9]. Second, the stereotypes and gender roles around nursing profession, which can prevent the recognition of mental fatigue from caregiving [10].

These circumstances converged and became intensified during the first waves of the global COVID-19 pandemic, with a severe impact on the mental health of nurses around the world. Several literature reviews have provided evidence of the negative impact of the COVID-19 pandemic on relevant indicators of nurses' mental health, such as mental overload, insomnia, anxiety, depression, post-traumatic stress syndrome, and other mental health disorders [11–15]. Other devastating legacies of the COVID-19 pandemic were the overflowing waiting lists that tested the patience and health of users, and the emerging mistrust of the scientific establishment and the healthcare system by large segments of the population, thus increasing the burden on healthcare workers. Conversely, some studies conducted among healthcare students found a positive impact of the COVID-19 pandemic on professional values [16, 17]. Thus, the COVID-19 pandemic provided a unique setting to study the role of certain professional characteristics on nurses' mental well-being [18, 19].

Nursing professional values (NPV) are the principles that govern the nursing discipline which have been agreed upon by different nursing associations worldwide. Professional values provide a nursing moral framework and shape ethical behavior, thereby aiding in complex decision making and maintaining nurses' moral obligation to follow organizational standards and not violate ethical principles [20]. Weis and Schank [21] defined professional values as "standards of action accepted by professionals and professional groups which provide a framework for evaluating beliefs and attitudes that influence behavior". Therefore, in daily professional practice, they provide the basis for care decisions [22, 23]. Although NPVs originate from each region's nursing history, cultural background, social groups, religion, and lived experiences, according to the American Nurses Association (ANA) [24], certain NPVs represent the ethical code of the profession and can be considered universal: altruism, autonomy, human dignity, social justice, and integrity [25]. A conceptual model for NPVs derived from the work of Weis and Schank [21, 25–27], which in turn is based on the ANA Code of Ethics, is shown in Figure 1.

Nurses' awareness of their professional values and how they impact their caring role constitute a central part of humanistic nursing care [28]. Ultimately, strong NPVs should contribute to adequate and safe care [20], even in complex clinical or organizational situations, which increase the physical and psychological demands on nurses. According

to the results of a cross-sectional study in Spain, NPVs were positively associated with compassion satisfaction during the COVID-19 pandemic [29]. We therefore hypothesized that NPVs would allow nurses to manage their levels of stress, anxiety, and depression under highly stressful conditions and work overload. This study aimed to explore the association between NPVs and mental health indicators of registered nurses (RNs) in Spain during the COVID-19 pandemic, specifically analyzing stress, anxiety, and depression.

2. Methods

2.1. Study Design and Participants. A cross-sectional study involving a sample of RNs of Asturias, a region in northern Spain of approximately 1 million inhabitants, with a network of 15 hospitals and 60 primary care centers. A minimum required sample size of 345 nurses was deemed necessary to detect clinically relevant differences in mental health indicators, considering a 3% margin of error and a 95% confidence interval. Participants were recruited through the Official Board of Nurses of Asturias using nonprobabilistic sampling. This institution integrates all the RNs who carry out their professional practice in the region, since professional membership is mandatory in Spain. An e-mail was sent to all the RNs ($N=4,550$), providing detailed information on the study and a link to an anonymous online form containing the study survey. In addition, participants were asked to provide informed consent and confirm that they met the established eligibility criteria when accessing this online form. RNs were included if they worked in any public or private health facility in Asturias and if they had patient contact since the beginning of the COVID-19 pandemic (March 2020). Conversely, RNs on sick leave due to accident, mental or physical illness between March 2020 and January 2021 were excluded. To maximize recruitment, information about the study and the link to the questionnaire were also posted on the institutional website of the Official Board of Nursing of Asturias.

Data collection was performed between December 2020 and January 2021, during the remission phase of the second wave of the pandemic in Asturias, the most severe in terms of cases and deaths of the entire COVID-19 pandemic. In November 2020, dubbed Black November, Asturias recorded the highest 14-day notification rate of the COVID-19 pandemic, with 650 cases per 100,000 inhabitants, which was well above the Spanish average. This month alone accounted for 46% of all COVID-19 deaths in 2020.

Prior to the mass mailing, a pilot test of the procedure and the survey were performed with 40 randomly selected RNs. By the end of the recruitment process, 435 surveys were received. Later, six duplicate records and nine participants with missing data on occupational variables were removed. Therefore, the final sample consisted of 420 RNs, representing 9.3% of the target population. Further details about the study are reported elsewhere [29].



FIGURE 1: Core professional values of nursing according to Weis and Schank [21, 25, 26].

2.2. Ethical Considerations. The study was approved by the Research Ethics Committee of Asturias (ref. 563/2020) and all participants gave informed consent. Participation was voluntary and anonymous. No incentives were offered. Data confidentiality and patient anonymity were preserved in compliance with the Spanish Organic Law 3/2018 of 5 December on Personal Data Protection and Guarantee of Digital Rights. This manuscript follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations.

2.3. Study Variables and Survey Instruments

2.3.1. Nursing Professional Values. NPVs were measured using a reduced version of the Nursing Professional Values Scale (NPVS-R) [26, 30], an instrument derived from the Code of Ethics of the American Nurses Association. The NPVS-R consists of 26 items grouped into five dimensions: caring (9 items), activism (5 items), trust (5 items), professionalism (4 items), and justice (3 items). The importance assigned to each value is scored according to a Likert-type scale of 1 to 5 points, with 1 being “not important” and 5 being “very important.” Weis and Schank supported the

internal consistency reliability of the five factors (alpha coefficients of 0.70 to 0.85) and of the total scale (alpha coefficient of 0.92) [26].

2.3.2. Mental Health. In our study, the mental health of the RNs was assessed by considering the self-perceived level of stress, and symptoms of anxiety and depression. Stress was measured using the Spanish version of the Perceived Stress Scale (PSS-14) [31]. With this tool, each RN assessed the degree of stress that certain day-to-day situations caused them during the month prior to the response. The PSS-14 consists of 14 items with five response options, consisting of 0 “never,” 1 “almost never,” 2 “from time to time,” 3 “often,” and 4 “very often,” although the score of some items must be reversed. The total score ranges from 0 to 56 points, with higher scores indicating higher levels of perceived stress. Cronbach’s alpha coefficient for this study was calculated to be 0.90. Consequently, it was determined that the scale had a high level of reliability for our sample.

Anxiety and depression were assessed using the Spanish version of the Hospital Anxiety and Depression Scale (HADS). This scale consists of two independent subscales of seven items each, which assess anxiety and depression symptoms during

the previous seven days [32, 33]. Each item has four response options, ranging from 0 “absence/minimal presence” to 3 “maximum presence.” Some items must be reversed to obtain the final HADS score. The score for each subscale ranges from 0 to 21 points, with a higher score indicating greater severity of symptoms. In our sample, we obtained an alpha of 0.92, which is considered an excellent reliability.

2.3.3. Potential Confounders. A set of potential confounding variables was generated based on a literature review followed by expert consensus. Sociodemographic data collected in the study included sex (male or female), age (in years), sentimental partner (yes or no), and having children (yes or no). Regarding work variables, the level of education (university degree or postgraduate degree, including master’s or doctorate), type of service (COVID-19 frontline unit, including emergency department, intensive care units and COVID-19 units, or second-line unit, including other services) and work shift (fixed morning, rotating shift or morning on-call) were considered.

2.4. Data Analysis. Statistical analyses were performed using STATA version 19 (StataCorp.; College Station, Texas). First, a Shapiro–Wilk normality test was performed on the data set of each measure and the results indicated that scores followed a normal distribution. Subsequently, linear regressions were used to obtain the b coefficients of the associations between the NPV scores and the three mental health indicators. Positive b coefficients indicated a direct association and negative coefficients indicated an inverse association. To rule out the potential confounding effect of some variables on the associations studied, in addition to a crude model, regression models were run adjusting for sociodemographic variables (age, sex, relationship, and children) and work variables (academic level, unit, and shift). Given that there was a strong correlation between all the NPVs (Table 1), each model was adjusted for the remaining NPVs. For example, when the NPV care was used as an independent variable, the model was additionally adjusted for activism, trust, professionalism, and justice. In this manner, the isolated contribution of each NPV on mental health was studied. Only *p* values <0.05 were considered statistically significant.

3. Results

The social and work characteristics of the sample are shown in Table 2. Most participants were women, aged 35–50 years and without children. Regarding the occupational variables, the most frequent were having completed only a university degree in nursing, second-line positions during the COVID-19 pandemic, and rotating work shifts.

The mean scores (\pm standard deviation) for the five dimensions of the NPVs were: 41.1 points for caring, 20.4 for activism, 22.4 for trust, 17.1 for professionalism, and 13.5 for justice (Table 3). Regarding the selected mental health indicators, the mean score for stress was 27.5 (± 9.71), 8.91 (± 4.39) for anxiety, and 6.66 (± 4.01) for depression.

According to the results of the linear regressions for the association between NPVs and mental health indicators, only activism was significantly and directly associated with stress, anxiety, and depression (Table 4). The higher the activism score, the lower the mental well-being score of the RNs, both in the crude models and those adjusted for confounding variables.

4. Discussion

According to the results of our study, conducted in the context of a situation of maximum clinical and ethical uncertainty, organizational difficulties, and high physical and emotional demands on healthcare workers, the activism of RNs was associated with worse mental health indicators. No other NPV was associated with the mental well-being of RNs.

Our study was the first to examine the association between NPV and multiple mental health indicators, hampering comparison with other studies. Overall, our findings did not support the study hypothesis, as NPVs did not mitigate the negative impact of the pandemic on the mental health of RNs. A plausible explanation is that the mental health of RNs was so affected by the demands of the COVID-19 pandemic that the ability of NPVs to guide clinical practice while maintaining mental well-being was severely reduced. Moreover, contrary to the hypothesis, higher activism scores were consistently associated with lower levels of stress, anxiety, and depression. Activism refers to an active role of RNs in aspects related to resource management, research, and transfer of relevant findings to clinical practice. It also represents the struggle to strengthen the profession and broaden its scope of action, with active participation in professional organizations. In addition, activism is considered necessary for leadership. Therefore, it refers to a conception of the profession that, without neglecting individual-centered care, is oriented towards the global health of populations, and seeks to empower the nursing discipline by participating in health policies [27]. In short, activism is inherent to the nursing profession, since RNs are the advocates and interlocutors of the people in relation to the healthcare system [34]. Although it is not one of the dominant NPVs in normal situations [35], its characteristics may make activism particularly relevant in exceptional socio-health situations that require RNs to take a step forward.

The association between activism and poorer mental health has already been documented by some other authors, who found that activism was related to lower job satisfaction and higher emotional burden and could increase stress and anxiety [36–38]. The reasons that may explain this association are varied. First, the mental and emotional sacrifice demanded by activism may contribute to the onset of anxiety and depressive symptoms [36]. Getting involved in organizational issues and striving to translate recent findings into clinical practice can be mentally challenging and emotionally draining, because it usually pits the activist against management, peers, and one’s own personal limitations. For this reason, building a positive view of activism would help

TABLE 1: Correlation between nursing professional value scores ($n = 420$).

	Care	Activism	Trust	Professionalism	Justice
Care	—	—	—	—	—
Activism	0.59***	—	—	—	—
Trust	0.71***	0.63***	—	—	—
Professionalism	0.58***	0.77***	0.70***	—	—
Justice	0.71***	0.69***	0.74***	0.63***	—

Values are Pearson's correlation coefficients. *** $p < 0.001$.

TABLE 2: Characteristics of the sample ($n = 420$).

	Participants, n (%)	NPV, mean score (sd)				
		Care	Activism	Trust	Professionalism	Justice
Sex						
Male	55 (13.1)	41.3 (4.07)	20.1 (4.33)	22.4 (2.58)	17.0 (3.15)	13.4 (1.88)
Female	365 (86.9)	41.1 (4.50)	20.5 (3.70)	22.4 (2.53)	17.1 (2.94)	13.5 (1.83)
p value ^a		0.765	0.456	0.784	0.840	0.715
Age						
<35 years	133 (31.7)	40.7 (4.97)	20.2 (3.92)	22.3 (2.62)	16.8 (3.07)	13.3 (1.88)
35–50 years	178 (42.4)	41.4 (4.94)	20.7 (3.72)	22.5 (2.40)	17.4 (2.76)	13.6 (1.75)
>50 years	109 (26.0)	41.1 (4.12)	20.3 (3.75)	22.4 (2.64)	16.9 (3.13)	13.5 (1.89)
p value ^a		0.357	0.367	0.786	0.164	0.365
Relationship						
No partner	90 (21.4)	41.1 (4.37)	20.0 (4.06)	22.5 (2.48)	17.1 (2.88)	13.5 (1.83)
In a relationship	330 (78.6)	41.1 (4.71)	20.5 (3.71)	22.3 (2.71)	16.7 (3.25)	13.6 (1.86)
p value ^a		0.960	0.203	0.564	0.242	0.660
Children						
No children	235 (56.0)	40.9 (4.66)	20.1 (3.95)	22.4 (2.59)	16.8 (3.09)	13.5 (1.85)
Children	185 (44.0)	41.4 (4.15)	20.9 (3.54)	22.5 (2.46)	17.3 (2.78)	13.6 (1.81)
p value ^a		0.352	0.051	0.689	0.087	0.627
Educational level						
Degree	327 (77.9)	41.1 (4.43)	20.3 (3.86)	22.4 (2.59)	17.0 (2.98)	13.5 (1.82)
Postgraduate degree	93 (22.1)	41.2 (4.51)	20.9 (3.51)	22.6 (2.30)	17.2 (2.89)	13.5 (1.87)
p value ^a		0.762	0.136	0.502	0.534	0.834
Type of service						
Frontline unit	156 (37.1)	41.0 (4.26)	20.1 (4.04)	22.4 (2.48)	16.7 (3.10)	13.3 (2.02)
Second line unit	264 (62.9)	41.2 (4.55)	20.6 (3.66)	22.4 (2.57)	17.2 (2.88)	13.6 (1.70)
p value ^a		0.745	0.151	0.751	0.293	0.131
Work shift						
Fixed morning	111 (26.4)	41.2 (4.38)	20.4 (3.86)	22.3 (2.59)	17.1 (3.01)	13.6 (1.68)
Rotating shift	228 (54.3)	41.0 (4.45)	20.4 (3.67)	22.4 (2.49)	17.0 (2.87)	13.4 (1.87)
Morning shift + on-call	81 (19.3)	41.4 (4.51)	20.5 (4.06)	22.6 (2.58)	17.1 (3.19)	13.6 (1.92)
p value ^a		0.658	0.985	0.749	0.986	0.799

NPV: nursing professional value, ^aUnpaired t -tests and one-way ANOVA tests were used to compare the means of each NPV score by selected variables.

TABLE 3: Nursing professional value scores ($n = 420$).

	Theoretical range	Observed range	Mean (SD)
Care	9–45	16–45	41.1 (4.44)
Activism	5–25	6–25	20.4 (3.79)
Trust	5–25	12–25	22.4 (2.53)
Professionalism	4–20	5–20	17.1 (2.96)
Justice	3–15	5–15	13.5 (1.83)

mitigate this deleterious effect. Mundie et al. [39] emphasize the importance of creating support networks for activist RNs as a way to ensure quality, sustainable, and protective nursing care for workers. Second, because activism is time-consuming, highly activist RNs need to put more effort into

direct patient care to meet their expectations, which may contribute to a sense of lack of accomplishment, leading to increased stress and anxiety. Third, activism may be associated with exposure to situations of ethical conflict. Nurses who engage in activism-related initiatives often do so to

TABLE 4: B coefficients (95% CI) for the association between professional nursing values scores and mental health indicators ($n = 420$).

	Stress		Anxiety		Depression	
	Coef. B (95% CI)	<i>p</i> value	Coef. B (95% CI)	<i>p</i> value	Coef. B (95% CI)	<i>p</i> value
Care						
Crude model	-0.18 (-0.50; 0.15)	0.280	-0.01 (-0.16; 0.13)	0.848	-0.07 (-0.20; 0.07)	0.323
Adjusted model ^a	-0.17 (-0.50; 0.15)	0.303	-0.02 (-0.17; 0.12)	0.758	-0.07 (-0.21; 0.06)	0.294
Activism						
Crude model	0.45 (0.27; 0.87)	0.037 ^b	0.24 (0.05; 0.43)	0.014 ^b	0.18 (0.01; 0.35)	0.042 ^b
Adjusted model ^a	0.46 (0.03; 0.88)	0.035 ^b	0.24 (0.05; 0.43)	0.014 ^b	0.19 (0.01; 0.36)	0.037 ^b
Trust						
Crude model	0.15 (-0.49; 0.80)	0.641	-0.02 (-0.31; 0.28)	0.915	0.03 (-0.23; 0.30)	0.807
Adjusted model ^a	0.12 (-0.52; 0.77)	0.710	-0.03 (-0.33; 0.26)	0.836	0.03 (-0.24; 0.30)	0.807
Professionalism						
Crude model	-0.58 (-1.12; -0.04)	0.036	-0.22 (-0.46; 0.03)	0.084	-0.18 (-0.41; 0.04)	0.114
Adjusted model ^a	-0.54 (-1.08; 0.00)	0.050	-0.21 (-0.45; 0.04)	0.102	-0.17 (-0.40; 0.05)	0.130
Justice						
Crude model	-0.31 (-1.18; 0.56)	0.489	-0.16 (-0.56; 0.23)	0.426	-0.18 (-0.54; 0.18)	0.322
Adjusted model ^a	-0.32 (-1.20; 0.55)	0.467	-0.13 (-0.53; 0.27)	0.520	-0.18 (-0.55; 0.18)	0.323

^aModel adjusted for sex, age, relationship, children, educational level, type of service, and work shift. ^bStatistically significant association.

achieve improvements in patients' rights or to defend the healthcare system, resulting in situations where ethics clash with the requirements imposed by institutional policies. This is especially relevant in exceptional situations and can trigger moral distress, sadness, and disillusionment at not being able to act according to their value system [40]. When there is a confrontation of the activist RN with the organization or the system, feelings of isolation and stigmatization may emerge, especially if the activist behavior is seen as a threat by management or peers [41].

Of the remaining NPVs included in this study, the only one that showed an association with a significant borderline *p* value was professionalism. In the crude analyses and adjusted for sociodemographic variables, a higher score in professionalism was associated with a lower level of stress. Kim et al. [42] observed a positive link between professionalism and quality of life in RNs, which can be considered a proxy for good mental health. Furthermore, in this study, professionalism was also associated with a better ethical climate and higher compassion satisfaction. In contrast, Gonzalez-Pando et al. have suggested that higher levels of expertise, which indicate active engagement in professionalism, may increase compassion fatigue among frontline nurses [29].

Clearly, all countries must learn to live with health crises, thus, it is imperative to build robust and resilient health systems that also protect their workers through positive work prospects and safe and healthy work environments [18, 19]. Although in this study NPVs were not associated with greater mental well-being, as hypothesized, preserving NPVs should be non-negotiable. A healthcare system that cultivates NPVs will always strive for excellence and safety and will place its staff and users at the center of care. Therefore, although our findings might discourage the promotion of activism, it should still be considered a core value, which strongly supports the precepts of nursing codes of ethics around the world. Indeed, one of the main factors explaining greater activism is having received a higher

quality university education [43]. Rather than attempting to improve the mental health of RNs by curtailing their activism, which would undermine the social and health outcomes of the nursing profession, it would be advisable to have programs to encourage activism in a rational manner and simultaneously design programs for the mental healthcare of the workforce. In addition, a cross-sectional study of 748 nurses from Saudi Arabia found that activism during the COVID-19 pandemic was significantly associated with higher professional competence [44], which may be another compelling reason to promote continuing education programs that emphasize the importance of NPVs.

In general, close monitoring of the psychological status of nurses and its determinants should be part of the ongoing preparedness efforts of health systems worldwide [45]. In addition, there is an urgent need to develop and implement local and national strategies, consistent with NPVs, to help nurses cope with the burden of mental and psychological disorders resulting from the demanding and emotionally draining work of caring for people and communities [46]. With the prospect of emerging health crises, this is an even higher priority.

This study had some limitations. First, the study design was cross-sectional; therefore, it is not possible to know the precise direction of the associations. However, considering the nature of the variables studied and previous scientific literature, the direction proposed in this study is plausible and more likely than the opposite. Second, because of the convenience sampling, the representativeness of the sample cannot be guaranteed. Although the number of responses was sufficient to detect relevant changes, selection bias cannot be ruled out. Respondents to voluntary web-based forms tend to be more interested in the topic of study and younger, which may affect the results. As the survey was delivered at times of high professional and personal demand due to the COVID-19 pandemic, it is possible that RNs with worse mental health indicators, more upset with the organization, and those who are more militant may have

responded, which may have affected our findings. Third, although the associations found regarding activism were statistically significant and consistent across models, they were clinically irrelevant. Finally, some variables of interest for a better understanding of the phenomenon, such as personality factors, were not included; their measurement would have greatly complicated data collection.

5. Conclusion

In conclusion, higher activism scores were associated with worse mental health indicators in Spanish RNs, including higher levels of stress, and symptoms of anxiety and depression. No other NPV was consistently associated with mental health. Organizational policies and programs should be established to protect the most activist RNs and to mitigate the potential detrimental effect of activism on mental health at times and/or circumstances of high work and personal demand. Well-designed studies are needed to test the longitudinal association between professional values and the mental health of RNs, as well as that of other healthcare workers.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

This study was approved by the Ethics Committee on Clinical Research of Principado de Asturias (Spain) (No 2020.563).

Disclosure

The funding agency had no role in the study design, data analysis, interpretation of results, writing of the report, and in the decision to submit the article for publication.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

AL and DG-P conceptualized the study, performed supervision, and proposed the methodology. MG-G and AF-F performed investigation. AL and BS-G performed formal analysis and wrote the original draft. DG-P provided funding acquisition and resources. MG-G and AF-F contributed to validation. MG-G, AF-F, and DG-P wrote, reviewed, and edited the article.

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Research Article

The Impact of Resilience on Workplace Violence Experienced by Mental Health Nurses: A Cross-Sectional Survey

Atallah Alenezi 

Department of Nursing, College of Applied Medical Sciences, Shaqra University, Shaqra, Saudi Arabia

Correspondence should be addressed to Atallah Alenezi; atta@su.edu.sa

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Background. Violence at work against healthcare professionals is a frequent and pervasive problem. There are growing data that indicate nurses are especially susceptible to experiencing violent acts at work. Resilience helps strengthen nursing competency in the proper management of stressful circumstances, like being exposed to workplace violence. **Aim.** The aim of the study is to assess the impact of resilience on workplace violence among mental health nurses. **Method.** A cross-sectional research design was used to conduct this study with a convenience sample of 361 nurses recruited from a governmental psychiatric hospital in Saudi Arabia. **Tools.** Data were collected using two tools: the first tool was the workplace violence questionnaire, which collected nurses' demographic, job, and workplace violence data, and the second was the resilience at work scale to assess nurses' resilience. **Results.** This survey found that 70.4% of nurses experienced workplace violence in the last year, and fewer than half were resilient at work. Close to one-third (33.5%) of nurses were terrified and confused after workplace violence. The most violent repercussions were psychological (46.8%): dread, tension, and worry. Additionally, 48.8% of nurses exhibited high work resilience. **Conclusion.** A considerable percentage of mental health nurses encountered instances of violence during the provision of care inside mental health hospital settings. The variables of nationality (non-Saudi nurses), rotating work shift, educational levels, and exhibiting a lower level of resilience were found to have a statistically significant correlation with instances of workplace violence. **Recommendation.** Training programs and educational initiatives should be developed and implemented to equip nurses with the necessary knowledge and skills to effectively respond to and prevent workplace violence incidents. By providing comprehensive training, healthcare organizations can empower nurses to address and mitigate workplace violence, ultimately creating a safer and more supportive work environment.

1. Introduction

Workplace violence poses a significant health concern for healthcare workers globally, including mental health nurses, who are particularly vulnerable to such incidents [1]. Workplace violence is defined as any act of physical abuse, intimidation, harassment, or threatening behavior occurring at the workplace; it encompasses a range of behaviors from verbal abuse to homicide [2]. Among the perpetrators, workplace violence was done by patients' relatives, patients, staff, and management [3].

Healthcare and social service personnel, including nurses, are particularly vulnerable to client violence, which accounts for 30% of all workplace homicides [2]. The prevalence of workplace violence within healthcare settings

is not limited to a single profession but extends across various sectors within the healthcare industry [4]. For instance, studies have reported a high prevalence of workplace violence among healthcare workers, including nurses, physicians, support staff, and paramedics. In the district of Peshawar, Pakistan, the estimated prevalence of workplace violence was found to be 51.0% [5]. Similarly, in northwest Ethiopia, more than half (58.2%) of healthcare workers, including nurses/midwives, physicians, general practitioners, and pharmacists/laboratory staff, reported experiencing at least one manifestation of workplace violence (physical, verbal, or sexual) in the past 12 months [6]. Recent research has also indicated a high prevalence of workplace violence among registered nurses, ranging from 70.0% to 80.0% [7]. Furthermore, a study conducted in upper

Northern Thailand found that the prevalence of physical workplace violence among nurses in the preceding 12 months was 12.1%, while the prevalence of psychological violence included verbal abuse (50.3%), bullying/mobbing (10.3%), and sexual harassment (1.6%) [8]. This elevated risk is attributed to the inherent nature of their roles and frequent interactions with patients, families, and visitors [9]. Workplace violence can occur across various healthcare settings, including hospitals, nursing homes, primary health care setting, and psychiatric facilities [4, 5].

Numerous factors contribute to the risk of workplace violence, including working closely with individuals with a history of violence, social and occupational pressures, organizational policies, employees' psychological attributes, and personal characteristics [10–12]. Nurses, in particular, are at risk due to their close proximity to patients and their families, who may exhibit aggressive behaviors due to illness, injury, or stress [13]. Najafi et al. [14] identified five categories of predisposing factors associated with workplace violence. These factors include unmet expectations of patients/relatives, inefficient organizational management, inappropriate professional communication, factors related nurses as poor stress management and lack of clinical competence among nurses, and factors related to patients, patients' relatives, and colleagues such as mistrust of nurses' job performance and a negative public image of the nursing profession.

Workplace violence has detrimental effects on nurses, leading to decreased job satisfaction, increased absenteeism, and poor service quality [15]. In acute psychiatric settings, nurses face heightened risks of aggression from service users, necessitating the adoption of effective coping strategies and resilience-building initiatives [16].

Resilience, characterized by self-awareness, faith, hope, insight, and self-care, plays a crucial role in mitigating workplace violence among nurses [17]. Developing personal resilience helps nurses to manage stress, preserve job satisfaction, and enhance job performance. Resilience interventions have shown promising results in reducing workplace violence and strengthening nurses' ability to cope with challenging situations [18].

There are several methods that can help nurses build their resilience. Providing comprehensive education and training on stress management techniques, self-care practices, and coping strategies is crucial [19]. Workshops, seminars, and ongoing professional development programs can equip nurses with the necessary tools to navigate difficult situations successfully. Additionally, establishing peer support networks and mentorship programs allows nurses to connect with and learn from their colleagues, fostering resilience through shared experiences and emotional support [20]. Developing emotional intelligence skills, such as self-awareness, empathy, and effective communication, further aids nurses in managing their emotions and responding empathetically to patients and colleagues, thereby enhancing their resilience [21]. Moreover, introducing mindfulness and relaxation practices, such as meditation, deep breathing exercises, and yoga, can also

contribute to resilience by promoting self-awareness, stress reduction, and emotional well-being [22]. Finally, promoting a healthy work-life balance through policies that prioritize adequate rest, time off, and scheduling flexibility is vital for nurses' resilience [23]. By recognizing the value of building resilience in nurses and allocating resources to support these concrete methods, healthcare organizations and leaders can create a more supportive and sustainable work environment that prioritizes the well-being and resilience of nurses.

To my knowledge, the existing research on workplace violence in healthcare has primarily focused on its prevalence, risk factors, and consequences for healthcare professionals in general. However, limited attention has been given to the role of resilience as a potential protective factor when mental health nurses in Saudi Arabia face workplace violence. While resilience has been recognized as a valuable resource for coping with occupational stress and adversity, its specific impact on workplace violence experienced by mental health nurses remains underexplored. Thus, the research gap lies in the need to investigate the relationship between resilience and workplace violence in the context of mental health nursing, providing a deeper understanding of how resilience can contribute to preventing or mitigating workplace violence incidents. This study aims to address this research gap by examining the impact of resilience on workplace violence experienced by mental health nurses.

1.1. Research Questions

- (1) What are the levels of workplace violence and resilience among mental health nurses?
- (2) Is there a relationship between resilience and workplace violence among mental health nurses?

2. Methods

2.1. Research Design and Setting. This study utilized a cross-sectional design to quantitatively assess the prevalence of an outcome (workplace violence) and associate various factors (resilience) at a single point in time. This study was conducted at a large, 530-bed inpatient psychiatric facility in Riyadh, Saudi Arabia. This government-run mental health center serves both adult and child patients from the local community presenting with a range of acute and chronic psychiatric conditions.

2.2. Participants. The present study utilized a convenience sampling method, consisting of 361 mental health nurses. The nurses included in the study were of both genders, had a minimum of one year of professional experience, showed a willingness to actively engage in the research, currently employed, and actively providing direct patient care. On the other hand, nurses with less than one year of clinical experience, part-time nurses, those not currently employed at the mental health center, and nurses occupying administrative or nonpatient care roles were excluded from the study.

2.3. Sample Size. The sample size was calculated using the formula $n = (Z2 * \sigma2)(p)(q)/d2$, where n indicates the required sample size, z is the standardized normal deviation corresponding to $\alpha = 0.05$ and 95% confidence level ($z = 1.96$, for two-tailed), p indicates the expected prevalence based on the previous study [24] ($p = 90.3\%$), q indicates $1 - p$, and d indicates the acceptable margin of error for the mean ($d = 5\%$). Consequently, a minimum sample size of 135 was initially determined, with consideration for an anticipated 10% attrition rate. Subsequently, the minimum required sample size should be 149 nurses. The researcher distributed a total of 406 questionnaires in order to ensure an adequate representation of the population and maintain statistical power. Out of the 406 questionnaires, 45 were found to be incomplete, leaving a total of 361 completed questionnaires for analysis.

3. Tools for Data Collection

3.1. Tool I: Resilience at Work Scale. This study utilized the resilience at work scale, which was adapted from the work of Winwood et al. [25], to assess resilience among mental health nurses. It comprises 17 items that are categorized into six dimensions: living authentically (3 items), finding your calling (3 items), maintaining perspective (2 items), managing stress (4 items), building social connections (3 items), and staying healthy (2 items). The Likert scale score for the nurses' responses was reduced from 7 to 5 points based on the expert opinions and recommendations. The scores on the scale range from 1 (strongly disagree) to 5 (strongly agree). For every negative statement, the score will be reversed. The overall score ranges from 17 to 85. Low resilience is shown by a score between 17 and 39, moderate resilience is shown by a score between 40 and 62, and high resilience is revealed by a score between 63 and 85.

3.2. Tool II: Workplace Violence Questionnaire. This questionnaire was developed by the researcher after reviewing recent literature [26–28]. It consisted of three components. The initial section focused on the demographic attributes of the participants, including variables such as age, gender, marital status, nationality, and experience. The subsequent phase of the study examined workplace data, working shifts, and the presence of workplace violence prevention techniques, including training programs, policies, and safety practices. The third part presents information pertaining to the empirical exposure of individuals to occurrences of workplace violence. The study included several aspects of violence, including its nature, origin, duration of occurrence, individuals responsible for its perpetration, responses to occurrences of violence, and suggestions provided by nurses to mitigate the exposure to such acts of violence.

Seven mental health and community care specialists examined the two instruments for content validity to assess their relevance, clarity, application, question phrasing, and interview duration. Following input, changes were made. Cronbach's alpha assessed tool dependability. The resilience scale's reliability coefficient was 0.82, which indicates strong reliability. A pilot study with 30 nurses tested tool feasibility

and clarity. Therefore, the appropriate changes were made. The pilot study nurses were omitted from the main sample of the study.

3.3. Ethical Consideration and Data Collection. The researcher gained approval from the Committee of Research Ethics at Shaqra University (ERC-SU-S-202400005). A formal correspondence was sent to the research institution to request authorization for the collection of essential data. Following a comprehensive explanation of the study's objective, authorization was obtained from the directors and departmental heads of the designated hospital to proceed with participant recruiting. Following a comprehensive elucidation of the study's objective, the researcher diligently collected signed informed permission from the participating nurses prior to the commencement of data collection. All individuals who took part in the study were provided with a guarantee of both anonymity and confidentiality, which extended beyond the duration of the research. To ensure participant anonymity, stringent, each participant was assigned a unique code that was used to identify their responses and data. This code was not linked to any personally identifiable information, ensuring the confidentiality of their identity. The participants were not provided with cash or monetary incentives for their participation in the study. However, the researcher expressed his appreciation for their involvement through acknowledging their contribution to the research and emphasizing the importance of their participation in generating valuable insights for the field. The importance of participants' voluntary engagement and their entitlement to resign from the research at any given point were also underscored. If a participant chose to withdraw, their data would be immediately removed from the dataset using their unique identifier assigned to the participant. Data collection began in January 2023 and finished in April 2023. After briefly outlining the study's goal and the requirement to gather data, the questionnaire was delivered individually in the study setting.

3.4. Data Analysis. The data that were gathered were systematically arranged, compiled into tables, and subjected to statistical analysis using IBM SPSS, version 23.0. The assumption of normality was acceptable, with categorical variables being expressed in terms of frequency and percentage. The mean and standard deviation were used to represent continuous variables. Binary logistic regression was chosen as the primary statistical analysis technique for predictive modeling with a binary outcome variable (workplace violence coded as 0 or 1). Demographic variables were entered into block 1 to control their potential confounding effects and resilience entered into block 2 in the regression model. A p value less than 0.05 was deemed to be statistically significant.

4. Results

4.1. Distribution of Nurses According to Their Demographic Characteristics and Their Relationships with Exposure to Workplace Violence. The majority of the sample consisted of

young people, with an average age of 30.31 years. The majority of respondents were male (76.5%), married (79.2%), and of Saudi nationality (71.5%). 52.1% of participants possessed a bachelor's degree in nursing. The mean clinical nursing experience in the sample was 9.97 years. The prevailing work patterns identified were regular shifts (63.4%) as opposed to rotational shifts (36.6%) and working non-morning shifts (53.2%) (Table 1).

4.2. Distribution of Nurses Based on Their Exposure to Workplace Violence. A significant proportion (70.4%) of the nurses experienced workplace violence at least once within the past year, mainly verbal, as reported by the majority (67.3%) of them, followed by physical and sexual violence (15.0%, 9.1%, respectively). Moreover, more than one-third (35.2%) of them were exposed to workplace violence three times or more. More than half (59.0%) of participants were exposed to violence in the morning, mainly by patients (45.4%), and the majority of them were exposed to violence by adult (53.2%) and male perpetrators (34.3%). Nearly one-third (33.5%) of the nurses experienced fear and confusion as immediate reactions to workplace violence. Furthermore, the predominant outcomes of violent incidents were psychological effects, specifically manifesting as fear, stress, and anxiety, accounting for 46.8% of cases. A majority of the nurses, specifically 65.4%, reported occurrences of violent situations (Table 2).

4.3. Suggestions from Nurses for the Prevention and Management of Workplace Violence. Strict penalties for violence perpetrators were the most frequent suggestion by more than half (50.7%) of the nurses, followed by adequate staffing to enhance health service quality (45.2%), attending training programs focused on violence prevention and management (38.8%). Additionally, 29.1% of participants indicated prioritizing the enhancement of nurses' qualifications. On the other hand, a minority (6.9%) of the nurses suggested the presence of an effective security system (Figure 1).

4.4. Nurses' Levels of Resilience at the Workplace. Most of the nurses had high levels of resilience in relation to the "living authentically" and "building social connections" domains (87.0% and 82.0%, respectively). Over three quarters of the participants, specifically 76.2 percent, exhibited a high level of resilience in the "finding your calling" domain. In contrast, less than half of the participants demonstrated a high level of resilience in the "staying healthy" and "managing stress" domains, with percentages of 47.9% and 46.8%, respectively.

Furthermore, slightly less than half (48.8%) of the studied nurses had a high total level of resilience at work (Figure 2).

4.5. Predictors of the Nurses' Exposure to Workplace Violence. The association between exposure to workplace violence and the characteristics of the participants was explored using binary logistic regression analysis (enter method), with exposure to workplace violence as the dependent variable. The overall model was statistically significant, $\chi^2(11) = 53.95$,

$p < 0.001$, indicating the predictors as a set reliably distinguished between exposure groups. The Cox & Snell R square was 0.139, suggesting that the predictors collectively explain about 13.9% of the variation in the nurses' exposure to workplace violence. Only four variables were found to be predictors of exposure to workplace violence such as nationality, education, work rotation, and resilience at work. The ORs (95% CI) for the nationality (reference: Saudi) were 0.55 (0.32–0.95). The ORs (95% CI) for secondary school education, technical institute, and bachelor's degree were 3.79 (1.30–11.02), 3.94 (1.08–14.40), and 2.92 (1.03–8.21), respectively. The ORs (95% CI) for work rotation types and resilience were 2.41 (1.15–5.05) and 0.92 (0.89–0.95), respectively (Table 3).

5. Discussion

The present study had two objectives: firstly, to evaluate the prevalence of workplace violence and resilience among mental health nurses; secondly, to delve into the intricate relationship between resilience and the perception of workplace violence among mental health nurses.

The findings of the current survey indicate that more than two thirds (70.4%) of the nurses reported instances of workplace violence over the last year. This finding comes in line with the results of Basfir et al. [24] who found that the prevalence of workplace violence among mental health nurses was 90.3%, alarming that nurses experience such a high level of violence. Furthermore, the finding of the present study noted that verbal violence was the most common type of violence experienced by most nurses, followed by physical violence. Similar findings were reported by Sun et al. [29] and Ferri et al. [30] who found that the most frequent type of violence was verbal abuse. Moreover, the current study found that the less common type of workplace violence was sexual violence (9.1%). This might be attributed to the fact that sexual violence and assault are deplorable actions across different communities and go against both the law and religious principles. This is supported by the results of Harthi et al. [31] who noticed that the rate of sexual harassment was lower than those reported in other countries and justified this lower prevalence of sexual assaults due to the nature of the Saudi community and its compliance with religious values and rules. Additionally, numerous effects of workplace violence have been documented in several studies, and these effects significantly affect employees' physical and mental health as well as their productivity and level of customer service [32, 33].

The study findings reported less than half of nurses (46.8%) indicated that they experience psychological effects resulting from their exposure to workplace violence. Additionally, a smaller proportion (17.7%) reported changes in work performance, including absences and decreased productivity, which can significantly affect the quality of care delivered. These findings disagreed with Small et al. [34] who reported that most of the participants were under-reporting workplace violence incidents, mainly because of their unawareness of the availability of such policies and not receiving training in the workplace. From the results of the

TABLE 1: Distribution of nurses according to their demographic characteristics and their relationships with exposure to workplace violence.

Characteristics	Exposure to workplace violence				Total (N = 361)	
	No (N = 107)		Yes (N = 254)		N	%
	N	%	N	%		
Age (years)						
20–30	55	28.1	141	71.9	196	71.9
31–40	36	30.8	81	69.2	117	69.2
>40	16	33.3	32	66.7	48	66.7
Mean ± SD	31.07 ± 8.55		29.99 ± 7.82		30.31 ± 8.05	
Gender						
Male	88	31.9	188	68.1	276	76.5
Female	19	22.4	66	77.6	85	23.5
Marital status						
Married	79	27.6	207	72.4	286	79.2
Not married	28	37.3	47	62.7	75	20.8
Nationality						
Saudi	68	26.4	190	73.6	258	71.5
Non-Saudi	39	37.9	64	62.1	103	28.5
Educational qualifications						
Secondary school of nursing	34	28.6	85	71.4	119	33.0
Technical institute of nursing	8	23.5	26	76.5	34	9.4
Bachelor's degree of nursing	54	28.7	134	71.3	188	52.1
Postgraduate studies	11	55.0	9	45.0	20	5.5
Years of experience						
<5	43	28.5	108	71.5	151	41.8
5	8	16.7	40	83.3	48	13.3
10	14	21.2	52	78.8	66	18.3
≥15	42	43.8	54	56.3	96	26.6
Mean ± SD	10.99 ± 8.45		9.54 ± 7.57		9.97 ± 7.85	
Work rotation type						
Regular shift	80	34.9	149	65.1	229	63.4
Rotating shift	27	20.5	105	79.5	132	36.6
Work shift						
Morning	49	25.5	143	74.5	169	46.8
Nonmorning (evening/night)	58	34.3	111	65.7	192	53.2

present study, it could be observed that around half of the studied nurses were exposed to workplace violence three and more attacks in the last year. The study's findings supported with Clari et al. [35] and Sisawo et al. [36] who reported that most health care workers experienced three and more violent events. Like many studies, the patients and their relatives were frequently reported as the main perpetrator of violence toward nurses [3]. This might be accounted for by the fact that nurses are frequently the first-person that patients and their families meet and have more direct interactions with them. They are frequently held responsible for late or subpar health services. As a result, they take the brunt of patients' unruly behavior, their relatives' dissatisfaction with the care they receive, and/or the confusing hospital rules that outsiders are expected to follow. In a sense, nurses end up being the scapegoat. Additionally, nurses who are understaffed and compelled to hurry care increase patient and family dissatisfaction with the care they receive, raising the risk of violence in the workplace [37].

Unfortunately, the current study noted that less than half of the studied nurses reported occurrence of violent acts from their coworkers such as physicians, nurses, and supervisors. This is not what one would expect, as a safe environment should be provided for both patients and the

coworkers themselves in a health care setting that is free from threats of violence. In the same context, the result of Ope-babadele and Ilesanmi [38] found that physicians and supervisors were among the sources of workplace violence against nurses.

Furthermore, the results from the current study highlight that nurses who were working rotating shifts and evening and night shifts reported more exposure to violent attacks. This finding aligns with the research conducted by Sun [29], which revealed a correlation between heightened risks of work-related violence and nurses who were assigned to evening, night shifts, and rotating day schedules. This may be due to inadequate security and having fewer nurses' numbers in comparison to the morning shift creating an environment that is conducive to violence. For instance, the study of Chaiwuth et al. [8] found that risk factors for verbal abuse included being a registered nurse with direct nursing care responsibilities; workplaces without adequate security; and having workplace violence concerns. Moreover, the study of Basfr et al. [24] found that the time of violence, source of violence, patient dissatisfaction with medical care, and lack of organizational support for nurses were significantly associated with the occurrence of workplace violence in psychiatric units.

TABLE 2: Distribution of nurses according to their experience of workplace violence.

	N	%
Workplace violence exposure at least one within the past year		
No	107	29.6
Yes	254	70.4
Type of workplace violence#		
Verbal workplace violence	243	67.3
Physical workplace violence	54	15.0
Sexual workplace violence	33	9.1
Frequency of exposure to workplace violence		
Single occurrence	63	17.5
Dual occurrence	64	17.7
Three or more occurrences	127	35.2
Time of exposure to workplace violence#		
Morning	213	59.0
Evening	52	14.4
Both	45	12.5
Perpetrator of workplace violence#		
Patients/clients	164	45.4
Patients' relatives	119	33.0
Coworkers (supervisors, physicians, and nurses)	115	31.9
Sex of perpetrators#		
Male	124	34.3
Female	53	14.7
Both	77	21.3
Age group of perpetrators#		
Adult	192	53.2
Elderly	93	25.8
Immediate response to violence#		
No response	66	18.3
Fear/confusion	121	33.5
Notify manager	65	18.0
Defend self	65	18.0
Call for help	23	6.4
Consequences of workplace violence#		
Psychological consequence	169	46.8
Physical consequence	3	0.8
Work outcomes (absenteeism and lessen performance)	64	17.7
No impact	29	8.0
Reporting of violence incidents		
No	88	34.6
Yes	166	65.4

#Respondents could select more than one answer.

The current study found that the majority of the nurses exhibited either high or moderate levels of resilience, indicating their ability to effectively cope with and adapt to workplace challenges. These findings align with the results of an integrative review study conducted by Bui et al. [1], which examined the resilience levels of mental health nurses. The review study found that mental health nurse resilience tends to be moderate to high. Also, a literature review study of foster et al. [39] found that resilience in mental health nursing is most often moderate, with positive correlations with hardiness, self-esteem, life and job satisfaction, and negative correlations with depression and burnout. However, the study of Zheng et al. [40] conducted at the Institute of Mental Health in Singapore demonstrated that psychiatric

nurses have a moderately low level of resilience. Delgado et al. [41] reported that mental health nurses in Australia had high level of resilience.

From the results of the present study, it could be observed that nurses with high level of resilience are less exposed to workplace violence. This could be attributed to the fact that resilience is seen as a person's positive and constructive responses to stressful situations to promote healthy behaviors. These findings supported by the study Alonazi et al. [42] found that higher resilience levels were associated with higher levels of compassion satisfaction and lower levels of secondary traumatic stress among mental health nurses. Furthermore, an integrative review study of Bui et al. [1] demonstrated that resilience was positively associated with psychological well-being, post-traumatic growth, and compassion satisfaction and negatively associated with burnout, mental distress, and emotional labor among mental health nurses. Notably, Yang et al. [43] emphasized the importance of prevention, de-escalation skills, effective coping strategies, and communication skills in reducing workplace violence among mental health nurses. Similarly, Fida et al. [44] conducted a time-lagged study that highlighted the protective role of relational occupational coping self-efficacy in shielding nurses from workplace incivility, burnout, mental health issues, and turnover intentions. Furthermore, Hsieh et al. [45] demonstrated that personal strength, social competence, and a structured approach serve as protective factors against depressive tendencies in emergency department nurses exposed to workplace violence. Building on these findings, Lozano et al. [12] conducted a systematic review, revealing a significant association between workplace violence and burnout symptoms among nurses and physicians. They identified risk factors such as structural and personal factors, while highlighting the role of a quality work environment and effective coping strategies as protective factors. In the context of healthcare, Morphet et al. [46] conducted a systematic review that underscored the effectiveness of consumer risk assessment, staff education, and aggression management teams in reducing workplace violence. However, their findings indicated no evidence to support the efficacy of zero tolerance policies, incident reporting, and duress alarms. Furthermore, d'Ettoire et al. [19] emphasized the importance of prioritizing training, improved communication skills, accurate reporting, and optimized workplace design in minimizing stressful conditions in waiting rooms to effectively manage workplace violence against healthcare workers in emergency departments. Additionally, Hsieh et al. [47] identified higher family support as a key protective factor against the development of depressive symptoms among assaulted psychiatric ward nurses.

5.1. Limitations of the Study. This study had several limitations. Firstly, the findings may lack generalizability to broader populations of healthcare workers or other settings due to the homogeneity of the sample. The exclusive focus on mental health nurses limits the extrapolation of results to healthcare professionals in different specialties or roles who

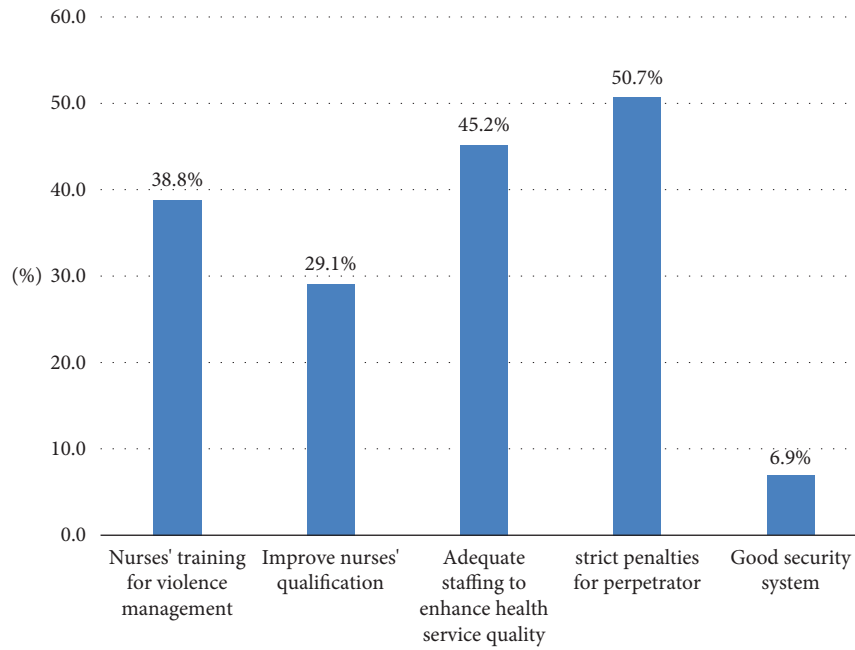


FIGURE 1: Suggestions from nurses for the prevention and management of workplace violence. Respondents were allowed to select multiple options.

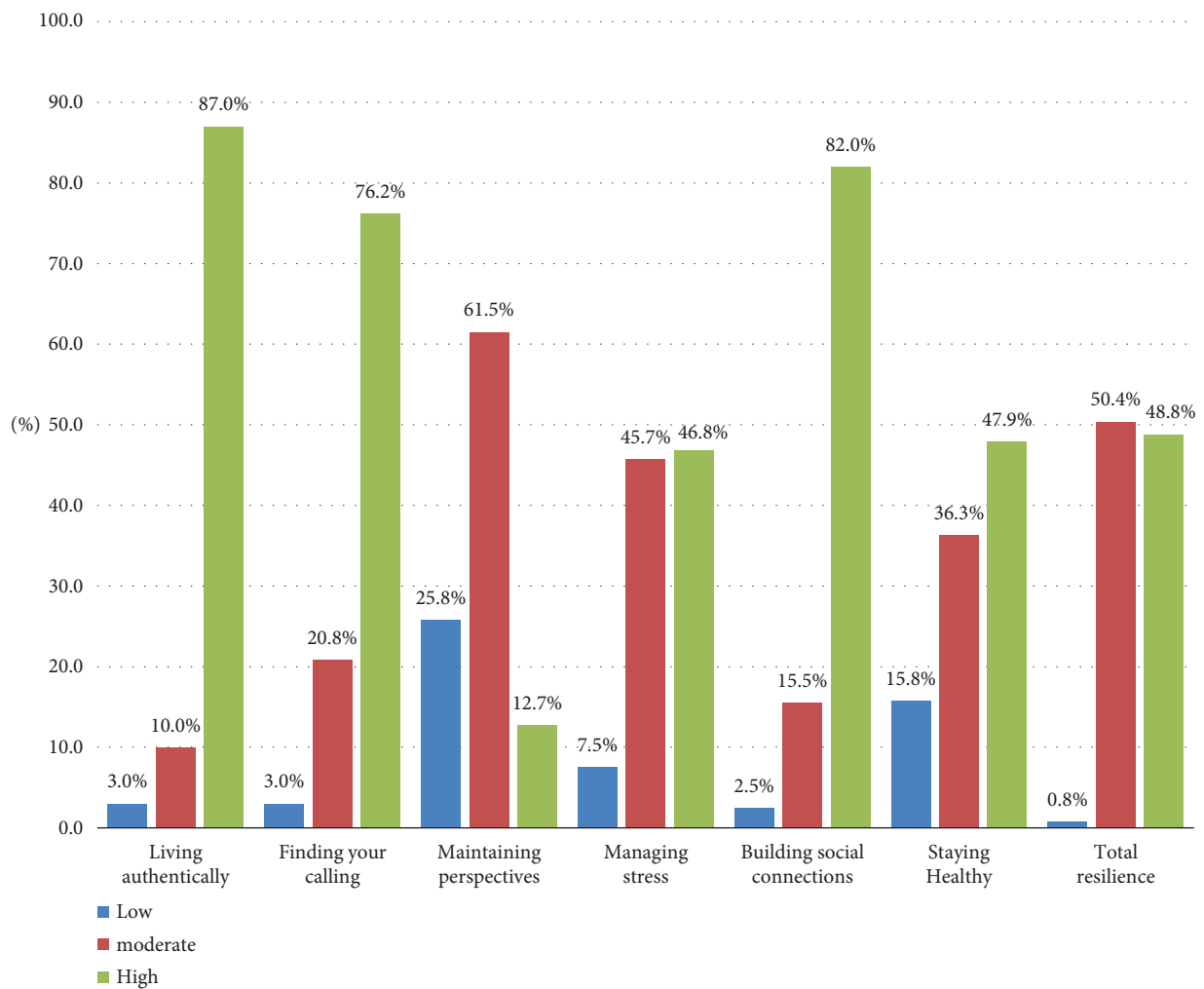


FIGURE 2: Nurses' levels of resilience at workplace.

TABLE 3: Binary logistic regression for the predictors of workplace violence experiences among the studied nurses.

	B	S.E.	Wald	Sig.	ORs	95% CI for exp (B)	
						Lower	Upper
Age	-0.01	0.02	0.14	0.71	0.99	0.95	1.03
Sex	0.44	0.33	1.79	0.18	1.55	0.82	2.93
Marital status	-0.54	0.31	2.97	0.08	0.58	0.32	1.08
Nationality	-0.59	0.28	4.62	0.03	0.55	0.32	0.95
Education							
Secondary school	1.33	0.54	5.98	0.01	3.79	1.30	11.02
Technical institute	1.37	0.66	4.31	0.04	3.94	1.08	14.40
Bachelor's degree	1.07	0.53	4.10	0.04	2.92	1.03	8.21
Postgraduate studies							
Experience	-0.04	0.02	3.65	0.06	0.96	0.92	1.00
Type of work rotation	0.88	0.38	5.45	0.02	2.41	1.15	5.05
Shift type	0.20	0.34	0.35	0.55	1.22	0.63	2.39
Resilience at work	-0.08	0.02	22.46	<0.001	0.92	0.89	0.95
Constant	5.25	1.32	15.79	<0.001	189.72		

may face distinct risk factors for workplace violence. Moreover, employing convenience sampling introduces potential selection bias, as participants may not be representative of the entire population of interest, leading to skewed findings and decreased external validity. Additionally, the use of a cross-sectional design restricts the ability to establish causal relationships between variables, as it provides only a snapshot of data at a single point in time, precluding longitudinal assessment of trends and changes over time. Therefore, future research endeavors should strive for greater diversity in samples, employ more rigorous sampling methodologies, and consider longitudinal or mixed-methods approaches to enhance the robustness and generalizability of findings regarding workplace violence in healthcare settings.

5.2. Implications for Practice. Based on the research findings, it is evident that workplace violence is a significant concern among mental health nurses, with a majority of them reporting incidents of violence within the past year. The study findings also indicate that the level of resilience among these nurses ranged from moderate to high. This suggests that while some nurses demonstrated moderate resilience levels, others exhibited higher levels of resilience. The varying range of resilience levels highlights the diversity among nurses in their ability to adapt and cope with the challenges they face in their roles. It is also important to note that resilience plays a crucial role in protecting nurses from the negative effects of workplace stressors, including violence. The study emphasizes the need for healthcare administrators and policymakers to address the issue of workplace violence and prioritize interventions aimed at enhancing resilience among mental health nurses. By investing in initiatives that promote resilience, healthcare organizations can better support nurses in coping with workplace challenges and mitigating the psychological consequences of violence.

6. Conclusion

Based on the results of the present research, it can be inferred that most of the nurses surveyed had occurrences of workplace violence over the last year. This observation is particularly concerning as it reflects the challenges and risks faced by healthcare professionals in their daily work environment. Furthermore, fewer than half of the participants exhibited a high degree of resilience, while the remaining individuals demonstrated a moderate level of resilience. Resilience plays a key role in protecting the negative effects of workplace stressors, including exposure to violence and aggression. The relatively low level of resilience among mental health nurses suggests a potential vulnerability that declares attention from healthcare administrators and policymakers. Furthermore, a noteworthy inverse relationship was seen between the level of workplace violence experienced by nurses and their level of resilience. This finding highlights the importance of fostering resilience among mental health nurses as a protective factor against the negative impact of workplace violence. Nurses with higher levels of resilience may be better equipped to cope with the stressors associated with their profession.

Data Availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this paper.

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Research Article

The Impact of Shared Governance Model's Implementation on Professional Governance Perceptions of Nurses in Saudi Arabia: A Randomised Controlled Trial

Mahmoud Hamdan ^{1,2} and Amar Hisham Jaafar ^{3,4}

¹King Saud Medical City, Riyadh, Saudi Arabia

²College of Graduate Studies (COGS), Universiti Tenaga Nasional (UNITEN), Putrajaya Campus, Jalan IKRAM-UNITEN, Kajang 4300, Selangor, Malaysia

³Institute of Energy Policy and Research (IEPRE), Universiti Tenaga Nasional (UNITEN), Putrajaya Campus, Jalan IKRAM-UNITEN, Kajang 4300, Selangor, Malaysia

⁴College of Business Management and Accounting (COBA), Universiti Tenaga Nasional (UNITEN), Putrajaya Campus, Jalan IKRAM-UNITEN, Kajang 43000, Selangor, Malaysia

Correspondence should be addressed to Mahmoud Hamdan; mahmoudhamdan97@outlook.com

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Objective. This study aimed to evaluate the impact of the shared governance model application on the level of perceived professional governance among clinical nurses in a tertiary hospital in Riyadh. **Background.** Professional governance continues traditional governance, shared governance, and self-governance. Shared governance (SG) is the engagement of clinical nurses in decision-making at different levels. This empowers nurses, increases job satisfaction, improves clinical outcomes, and enhances patient satisfaction. **Methods.** This randomised control trial in which researchers distributed the Index of Professional Nursing Governance (IPNG) to a random sample of 440 nurses working in a 1200-bed tertiary hospital in Riyadh and divided into experimental and control groups. The intervention included designing and implementing a nursing shared governance model at the hospital level; professional governance was measured before and eight months after implementation. The IPNG was used to measure nurses' perceived level of professional governance before and after the intervention. The sample was divided into experimental and control groups. **Results.** By comparing experimental and control groups, there was no statistically significant difference between them regarding professional governance subscales and the total IPNG scores before the intervention. At the same time, there was a considerable difference between them after the intervention. Moreover, the scores of the six professional governance subscales and the overall IPNG scores significantly increased after the intervention in the experimental group. They showed no significant difference in the control group. **Conclusion.** Designing and implementing specific shared governance structures and processes effectively enhanced nurses' perceived level of shared governance at the hospital, as evidenced by significantly higher postintervention IPNG scores. Elements of the shared governance model that proved effective included engaging nurses in decision-making at various organizational levels and empowering their involvement.

1. Introduction

1.1. Background. Shared governance is a professional practice model that decentralizes decision-making in healthcare organizations by engaging frontline clinical nurses in a structural framework for participating in

organizational oversight, policy setting, and other administrative functions that directly impact their practice and work environment. The key principles of shared governance include empowering nurses through a collaborative management structure that gives them authority and control over practice-related decisions while also fostering a greater

sense of responsibility and accountability. At its core, shared governance aims to actively engage staff nurses beyond their traditional clinical roles by providing opportunities to have a meaningful voice and influence in the organizational decisions that govern their profession [1, 2].

Moreover, professional governance is a broader term involving the continuum of traditional, shared, and self-governance. Control over practice and resources moves gradually from management to clinical nurses in this continuum. The Index of Professional Nursing Governance (IPNG) is a valid and reliable tool used to measure it [3]. Previous research has shown the advantages of shared governance in nursing in the past few decades; it has been applied in various ways to hospital nurses. Improved nurse retention, work satisfaction, nursing-sensitive indicators, and patient satisfaction were some of these advantages [4–9].

Building a culture of shared governance supports nurses to be effective in decision-making, reducing centralisation in decision-making, increasing confidence and accountability, and creating a collaborative relationship between nurses and other healthcare professionals [10]. This is expected to enhance outcomes for nurses and patients [3, 11]. The shared governance framework is usually applied by moving from a hierarchical to a councillor model, which enhances the involvement of clinical nurses in decision-making [12].

1.2. Theoretical Framework. Kanter's theory of structural empowerment is considered a theoretical basis for nursing governance. According to the idea, structurally empowered nurses can achieve more due to their access to information, resources, support, and development opportunities [13, 14]. The theoretical underpinning of structural empowerment through shared governance models is directly linked to improved nursing and patient outcomes. This relationship between empowerment structures and positive results forms the basis of the Magnet recognition program developed by ANCC for hospitals in the US. While Saudi Arabia does not have an equivalent national accreditation system akin to Magnet, implementing shared governance principles aligned with Kanter's empowerment theory could still yield benefits seen in other contexts. The aim of this study is to explore if introducing shared governance councils in a Saudi hospital impacts nurses' perceptions of professional autonomy and influence, as measured by the IPNG tool, even without the external incentive of Magnet designation. Clarifying this connection and focus on potential internal outcomes rather than accreditation would better contextualize the rationale for the study within the Saudi healthcare system [7, 8].

Furthermore, structural empowerment is one of the main components of the Magnet® Model, and this Model is considered the heart of the American Nurses Credentialing Center (ANCC) Magnet® Recognition Program [15]. Magnet® hospitals or hospitals preparing for Magnet® apply this Model and usually implement shared governance frameworks to enhance nurses' involvement and improve outcomes related to nurses and patients [8, 9, 11]. There are three Magnet hospitals in Saudi Arabia, but several are still

on their journey toward Magnet® [16]. Studies investigating the effect of implementing the shared governance model on nurses' professional governance level are limited. This research has addressed how nurses' engagement in shared governance structures and processes significantly increase their professional governance. Kanter's theory of structural empowerment serves as the theoretical basis, proposing that empowering organizational structures like shared governance lead to greater job satisfaction and effectiveness. By decentralizing decision-making and giving nurses governance council roles, shared governance aims to structurally empower frontline staff. This study hypothesizes that implementing such a model will increase nurses' perceived professional governance as measured by the IPNG tool, in line with Kanter's empowerment concepts.

1.3. Research Question

- (1) What is the impact of the shared governance model application on the level of perceived professional governance among clinical nurses in a tertiary hospital in Riyadh?

2. Materials and Methods

2.1. Study Design. This study employed a randomized control trial design to evaluate the impact of implementing a shared governance model on nurses' perception of professional governance.

2.2. Study Groups. This randomised control trial measured the level of professional governance among a control group and an experimental group of clinical nurses before applying shared governance structures and processes in the hospital and 8 months after the implementation. Nurse participants were engaged in the shared governance model through participation in the main shared governance councils or unit-based councils (UBCs).

2.3. Inclusion Criteria. The inclusion criteria selected clinical nurses working at the tertiary hospital in Riyadh, Saudi Arabia. The nurses needed to have a minimum of three months of clinical nursing experience in order to have adequate exposure to the clinical environment. All participating nurses were also required to be permanently licensed. Another inclusion requirement was that nurses provided informed consent after being made aware of the study's aims and objectives. Only those nurses who completed both the preintervention and postintervention questionnaires, which assessed perceptions of professional governance before and after the implementation of the shared governance model, respectively, were fully included. By limiting inclusion to clinically active and experienced nurses who consented and could have their perceptions measured both longitudinally, the criteria aimed to comprise a sample population most appropriately suited for the study.

2.4. Exclusion Criteria. Nurses were excluded if they had less than 3 months of clinical experience, as they were still new to the clinical setting. Additionally, nurses who did not provide direct patient care, such as those in solely administrative roles, were excluded. Nurses who were on extended leave during the 8-month study period or who could not understand or speak English sufficiently to complete the English questionnaire were also excluded.

2.5. Study Participants. For this randomised control research, 440 clinical nurses from a variety of specialties were selected using a systematic random sampling process. The estimated sample size was determined using the Power Primer with a medium effect size, power of 0.80, and of 0.05 [14]. Using Microsoft Excel, randomisation was carried out by choosing every tenth nurse from a list of 2206 nurses. A permanent licensed nurse with a clinical employment in any hospital and at least three months of experience was the basis for recruiting the participants. Before receiving consent, the participants were informed of the study's aims and objectives. Before and after the intervention, the recruited nurses willingly consented to express their opinions. The initial sample size selected was 440 clinical nurses through systematic random sampling. However, attrition occurred over the course of the study. In the experimental group, 16 nurses withdrew participation and an additional 4 only partially completed the postintervention questionnaire, reducing that group's final sample to 200 nurses. In the control group, 19 nurses withdrew from the study, resulting in a final sample of 200 nurses who completed questionnaires at both time points. In total, the final sample size that completed the study was 200 nurses in each control and experimental groups, for a total of 400 nurses.

2.6. Study Setting. The study took place in a tertiary hospital in Riyadh, Saudi Arabia. A random sample of 440 clinical nurses from different specialties was recruited for this study and divided equally into two control and experimental groups. The research was conducted over eight months in three phases (see Figure 1). In phase 1, the researchers assessed the baseline level of professional governance among the nurse participants in the two groups using a questionnaire tool. In phase 2, the shared governance model, including structures and processes, was applied, and the experimental group nurses were supported to participate in the shared governance councils. In phase 3, the researchers reassessed the level of professional governance among the participants who participated in phase 1. 16 nurses withdrew from the experimental group, and four participants were also excluded from the experimental group because they only partially answered the study questionnaire. In addition, 19 nurses were excluded from the control group because they withdrew in phase 3.

2.6.1. Model Implementation. The design of the nursing shared governance model (see Figure 2) was derived from references related to the American Nurses Credentialing

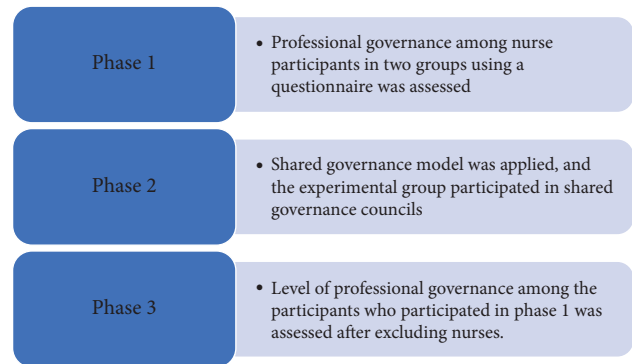


FIGURE 1: Phases of model implementation (source: author).



FIGURE 2: Shared governance model (source: author).

Center (ANCC) as well as the published shared governance experiences by Magnet hospitals and experts [12, 17–21]. The Model included seven main shared governance councils; the practice council, quality and patient safety council, education and professional development council, recruitment and retention council, research and evidence-based practice council, leadership council, and unit-based council (UBC) chairperson's council. The study selected a shared governance model from Magnet hospital literature and aligned with Kanter's empowerment theory, matching the theoretical framework. While not a Magnet facility, the hospital structure mirrored those achieving positive shared governance outcomes through councils empowering frontline involvement in decisions. Prior to implementation, staff reviewed the model for local relevance, customizing as needed. Its representation of staff and collaborative decision-making directly addressed assessing governance perceptions. Together, these links adequately justified applying this conceptual model to evaluate the intervention's influence.

In addition, a unit-based council (UBC) was developed in each nursing unit. The number of nurse members in each main shared governance council or UBC ranges from 5 to 12 members based on the capacity of the nursing unit. Furthermore, commonly shared governance bylaws were developed to regulate the hospital's structures, processes, and pathways of shared governance. This included the path and support of the ideas for improvement (IFIs) submitted by the UBCs. A charter was developed for each council to clarify the scope and main functions of the committee. The leadership council coordinated the efforts of the main shared governance councils and was led by the chief nursing officer. In addition, the main shared governance councils were led by senior nurse managers. However, the UBC chairpersons, members, and members of the main shared governance councils were clinical nurses.

Nurse managers and clinical nurses attended extensive awareness sessions about shared governance, including the new shared governance model, structures and processes, and the benefits of participating in shared governance councils for clinical nurses and the hospital. These awareness sessions helped introduce this major change to the clinical nurses. They motivated many of them to join the committees despite the current challenges of the nursing shortage and high workload. In addition, the sessions helped improve the tendency of nurse managers to maintain control of decision-making. Head nurses and nurse managers were encouraged to attend the UBC meetings as nonvoting members. Moreover, they supported the UBC members by facilitating their meetings and providing them with their time in shared governance activities. The experimental group nurses attended the awareness sessions and were motivated to participate in the main shared governance councils and the UBCs.

2.6.2. Data Collection. The questionnaire started with a demographic profile section. It was designed to encourage nurses to disclose their personal information related to this study to promote their completion of the questionnaire [22]. This section included questions for age, gender, marital status, length of service in a nursing career, working unit, size of service in the current working team, and highest educational qualification.

The Index of Professional Nursing Governance (IPNG 3.0) short form was used in this study. The tool was developed by Robert Hess (1998) and has been widely used to measure professional governance among nurses [23].

The IPNG includes six subscales and 50 items measuring nurses' governance perception. The overall score categorises governance as traditional governance when the total score ranges from 50 to 100, shared governance when the total score ranges from 101 to 200, and self-governance when the total score ranges from 201 to 250. This instrument uses a five-point Likert scale, which includes score 1 as nursing management/administration only, score 2 as primarily nursing management/administration with some staff nurse input, score 3 as equally shared by staff nurses and nursing management/administration, score 4 as especially staff nurses with some nursing management/administration and

score 5 as staff nurses only. Scores 1 and 2 reflect that decision-making is dominated by management/administration. Scores of 4 and 5 indicate that nurses participate more in decision-making.

The IPNG 3.0 short version contains six subscales of professional governance. First, nursing personnel assesses who controls nursing personnel and related structures, including 12 items. Second, information assesses who accesses the information related to governance activities and includes nine items. Next is the Resources subscale, which measures who has influence over hospital resources and consists of nine things. This is followed by the subscale of participation, which assesses who participates in shared governance structures at the unit and hospital levels and includes eight items. Next is practice, which measures who has control over the professional course and consists of seven things. Finally, the dimension of Goals contains five items, which assess who sets goals and negotiates conflict solutions. Data collection used the English version of the tool since the English language is the official language in the hospital and is used in communications, meetings, documentation, and handoff. The test-retest reliability test showed good reliability ($r = 0.857$), and internal consistency reliability was excellent ($\alpha = 0.966$). The applied longitudinal design may affect the recall bias of the nurse participants, but this was minimised by shortening the period between study phases.

2.6.3. Data Analysis. Data analysis was performed using the SPSS® software version 25 through the descriptive statistical measures of frequency distribution, mean, and standard deviation. Normality was assessed via the Kolmogorov-Smirnov test, which was insignificant ($p > 0.05$). Therefore, the parametric tests were applied for data analysis. To verify the study intervention, independent samples *t*-test and paired sample *t*-test were performed to compare the scores of professional governance subscales before and after the intervention. The significance level was set at less than 0.05.

2.7. Ethical Considerations. The Institutional Review Board of King Saud Medical City authorised the research. The IRB Registration Number with KACST, KSA is H-01-R-053. The hospital administrators and nursing department heads within the same health organisations also endorsed the visits. Each participant received a cover letter detailing the instruments' purpose, significance, content, instructions, and completion time. After reading the cover letter, each individual who agreed to participate in the study completed the informed consent form. Participants were free to quit the study at any time without penalties since participation was entirely voluntary.

To protect confidentiality, identifying information was removed from surveys before data entry and each participant was assigned a unique study ID number. Electronic data files and physical consent forms/surveys were securely stored in locked cabinets with limited access for research staff only. Final deidentified datasets did not contain any direct identifiers to allow for anonymous analysis and reporting of aggregate findings.

3. Results

3.1. Reliability. The IPNG Total Score and Factor Subscales were assessed for internal consistency using the test-retest reliability test. Table 1 demonstrated excellent reliability and the internal consistency of all the components, including personnel ($r = 0.962$), information ($r = 0.957$), participation ($r = 0.953$), and goals ($r = 0.949$), as Cronbach alpha value ranged from 0.8 to 0.89, the internal consistency and dependability of resources ($r = 0.860$) and practice ($r = 0.872$) were both good.

3.2. Comparison of Demographic Variables between the Two Groups. Most nurse participants were females, in the age group of 31 to 40 years, had a bachelor's degree, had an overall experience of between 6 to 10 years, and had experience in the current working unit between 1 and 5 years. In terms of the operational teams, they were equally divided between critical care units and noncritical care units. By comparing the demographic variables between the experimental and control groups, results indicate there was no significant difference between them ($p > 0.05$) (Table 2).

In Table 2, shared governance ranges are specified for each professional governance subscale and the overall professional governance score. For the level of professional governance measured for the nurse participants before the intervention for both groups, the mean professional governance scores were almost on the lower shared governance limits for each of the subscales except for personnel and participation subscales which were lower than the shared governance zone (traditional governance). Independent samples *t*-test was used to examine the difference between the two groups before and after intervention regarding professional governance subscales and the overall IPNG scores. Results show that difference between the two groups in terms of professional governance subscales is not significant and the total IPNG scores before the intervention ($p > 0.05$). However, the mean scores after intervention for the experimental group are significantly higher than those for the control group for all professional governance subscales and the total IPNG scores ($p < 0.001$).

3.3. Impact of the Shared Governance Model on Perceived Professional Governance among Clinical Nurses before and after Intervention. Both independent and paired sample *t*-test was used to compare the scores of the professional governance subscales and the total IPNG scores before and after the intervention. Mean scores of professional governance subscales and the full IPNG scores show no statistical significant difference before and after the intervention for the control group ($p > 0.05$), while the scores increased significantly for the experimental group after the intervention for the subscales as well as the total IPNG scores ($p < 0.001$) (Tables 3 and 4).

4. Discussion

The hospital of this study has several multidisciplinary committees that make decisions on issues related to their scope. Members of these committees are usually leaders and

TABLE 1: Internal consistency of the IPNG total score and factor subscales.

	Items	Cronbach's alpha (r)
Total instrument	50	0.979
Factor subscales		
Personnel	12	0.962
Information	9	0.957
Resources	9	0.860
Participation	8	0.953
Practice	7	0.872
Goals	5	0.949

managers, with minimal involvement of clinical nurses. However, the new shared governance structures and processes considerably involved clinical nurses enormously and supported them to be involved in making decisions related to their practice. These nurses were supported to receive, review, and discuss data related to their unit, including nursing-sensitive indicators, patient satisfaction, and nurses' job satisfaction.

The findings of this study showed that the baseline professional governance scores among clinical nurses were at the lower shared governance limits for the majority of the professional governance subscales as well as the overall scores. This is consistent with the findings of studies conducted in Saudi Arabia, Jordan, Lebanon, Egypt, and the United States [8, 9, 11, 24–26].

The mean scores of professional governance subscales after the intervention for the experimental group are significantly higher than those for the control group. In addition, the mean scores of professional governance subscales after the intervention are considerably higher than the mean scores before the intervention for the experimental group ($P < 0.001$). This indicates that the professional governance perceptions of clinical nurses improved after implementing the shared governance model and engaging nurses in the shared governance councils and processes. These findings confirm to a longitudinal study conducted in the US, in which the researchers measured professional governance among nurses in 2013, 2015, and 2017 using the IPNG [26].

Since the hospital had no proper shared governance structures in the first two surveys, results showed total governance scores of 168.62 and 168.39 using IPNG 2.0, below the shared governance zone. After applying better-shared governance structures, the entire shared governance score was 103.84 using IPNG 3.0 within the shared governance zone. Therefore, measuring shared governance among nurses, especially when changes occur, is recommended. Implementing a shared governance model improves nurses' perceptions of professional authority and enhances the culture of shared governance.

This study's findings also confirm the results of a quasi-experimental study conducted in the US, in which the scores of shared governance dimensions increased significantly after enhancing shared governance structures and processes [19]. The interventions included (1) interprofessional strategic planning retreats every six to eight months, (2) celebrating shared governance achievements

TABLE 2: Comparison of demographic variables between the two groups.

Variable	Scale	Experimental group	Control group	<i>p</i> value (>0.05)
Age (year)	21–30	51 (25.5)	50 (24.9)	>0.05
	31–40	86 (43)	84 (41.8)	>0.05
	41–50	46 (23)	49 (24.3)	>0.05
	51–60	17 (8.5)	18 (9)	>0.05
Gender	Male	2 (1)	0 (0)	>0.05
	Female	198 (99)	201 (100)	>0.05
Education	Diploma	18 (9)	15 (7.5)	>0.05
	Bachelor	157 (78.5)	160 (79.6)	>0.05
	Postgraduate	25 (12.5)	26 (12.9)	>0.05
Overall experience (year)	1–5	19 (9.5)	18 (9)	>0.05
	6–10	87 (43.5)	85 (42.3)	>0.05
	11–15	24 (12)	26 (12.9)	>0.05
	>15	70 (35)	72 (35.8)	>0.05
Working unit	Critical care	101 (50.5)	102 (50.7)	>0.05
	Noncritical care	99 (49.5)	99 (49.3)	>0.05
Experience in the current unit (year)	1–5	76 (38)	74 (36.8)	>0.05
	6–10	61 (30.5)	59 (29.4)	>0.05
	11–15	38 (19)	39 (19.4)	>0.05
	>15	25 (12.5)	29 (14.4)	>0.05

TABLE 3: Results of shared governance subscales and overall IPNG scores before and after intervention (independent sample *t*-test).

Variable	Group	Before intervention			After intervention		
		Mean	SD	<i>p</i> value	Mean	SD	<i>p</i> value
Personnel (25–48)	Experimental	18.91	9.29	>0.05	31.93	15.40	<0.001
	Control	18.96	9.27		18.84	9.38	
Information (19–36)	Experimental	20.87	6.49	>0.05	28.96	10.52	<0.001
	Control	20.92	6.61		20.89	6.59	
Resources (19–36)	Experimental	22.46	7.14	>0.05	28.28	8.71	<0.001
	Control	22.43	7.02		22.30	7.04	
Participation (17–32)	Experimental	14.87	6.77	>0.05	23.27	9.56	<0.001
	Control	14.89	6.78		15.00	6.87	
Practice (15–28)	Experimental	16.00	5.40	>0.05	21.98	6.92	<0.001
	Control	16.12	5.40		15.99	5.40	
Goals (10–20)	Experimental	11.24	4.17	>0.05	14.47	6.43	<0.001
	Control	11.28	4.12		11.23	4.11	
Total IPNG score (101–200)	Experimental	104.36	31.31	>0.05	148.91	49.81	<0.001
	Control	104.63	31.32		104.26	31.63	

annually, (3) developing three new unit-based councils as part of the hospital's shared governance structure, (4) increasing nurses' access to the hospital library as well as shared governance paid time, (5) enhancing nurses' involvement in budgeting, and (6) submitting annual goals and quarterly progress reports to the coordinating council, and training the councils so they can conduct effective, shared governance meetings. Moreover, according to a longitudinal study in which professional governance perceptions among clinical nurses were measured in 2012 and 2015, professional governance increased after enhancing the shared governance model and allowing nurses to participate in decision-making on different levels [27].

Once the shared governance model was designed and approved, it was announced to all nurses. In addition, nurse managers and clinical nurses attended extensive awareness sessions about the Model and the pathways. Moreover, the

availability of unit-level data was helpful for the UBCs to ensure that their IFIs were data-driven. Furthermore, head nurses and nurse managers facilitated the UBC meetings, attended the meetings as nonvoting members, and supported clinical nurses by giving them the time they spent in shared governance activities back to them. This helped support shared governance and was consistent with the findings of the study conducted in Finland to describe factors that support or obstruct shared administration. Semistructured interviews revealed nurse managers' support, enthusiastic personnel, and neighbouring universities supported shared governance. However, blocking factors included lack of time, poor understanding, and insufficient skills [28]. When clinical nurses are engaged in shared governance, and their ideas of improvement are supported, improvement is expected in nursing-sensitive indicators, patients' satisfaction, and nurses' job satisfaction [6–8].

TABLE 4: Results of shared governance subscales and overall IPNG scores in the experimental and control groups before and after intervention (paired *t*-test).

Variable	Group	Before intervention		After intervention		<i>p</i> value
		Mean	SD	Mean	SD	
Personnel (25–48)	Experimental	18.91	9.29	31.93	15.40	<0.001
	Control	18.96	9.27	18.84	9.38	>0.05
Information (19–36)	Experimental	20.87	6.49	28.96	10.52	<0.001
	Control	20.92	6.61	20.89	6.59	>0.05
Resources (19–36)	Experimental	22.46	7.14	28.28	8.71	<0.001
	Control	22.43	7.02	22.30	7.04	>0.05
Participation (17–32)	Experimental	14.87	6.77	23.27	9.56	<0.001
	Control	14.89	6.78	15.00	6.87	>0.05
Practice (15–28)	Experimental	16.00	5.40	21.98	6.92	<0.001
	Control	16.12	5.40	15.99	5.40	>0.05
Goals (10–20)	Experimental	11.24	4.17	14.47	6.43	<0.001
	Control	11.28	4.12	11.23	4.11	>0.05
Total IPNG score (101–200)	Experimental	104.36	31.31	148.91	49.81	<0.001
	Control	104.63	31.32	104.26	31.63	>0.05

5. Strengths and Limitations

One of the key strengths of the study is that it provides practical implications and solutions for designing and implementing shared governance structures and processes to enhance shared governance among clinical nurses. Furthermore, the main shared governance councils and the unit managers supported their ideas for improvement. Since the hospital was in the early stages of its journey toward Magnet®, hospital leaders were committed to applying a shared governance model to reap its benefits for patients and nurses. The sample was predominately female, reflecting the typical gender bias of this research and accurately representing the target demographic. Using a self-reported questionnaire raised the possibility of prejudice and impaired the impartiality of the nurses' replies. Yet, the researchers used an experimental design, random sampling, and a valid and reliable tool to assess clinical nurses' perspectives of professional governance. In addition, the research validated the use of a focused intervention to improve shared governance and presented a replicable model.

6. Conclusion

This study evaluated the effectiveness of the shared governance model's implementation among clinical nurses on their perceived level of professional governance. The Model's performance effectively improved the shared governance level among clinical nurses. These findings are of great value for hospitals struggling with lacking or ineffective shared governance structures. Applying the shared governance model successfully improved the six dimensions of professional governance among the nurse participants. A more extensive expansion to this study would be to measure the impact of shared governance on nursing-sensitive indicators, patient satisfaction, and nurses' job satisfaction.

7. Implications

The results of this study indicate that implementing a shared governance model can significantly empower nurses and increase their perceptions of professional autonomy and involvement in decision-making. By establishing formal councils and unit-based committees that give clinical nurses a strong voice, shared governance appears to foster increased collaboration between frontline staff and managers. When nurses feel respected and that their perspectives directly impact important areas like patient care, staffing, and quality improvement, it can boost morale and retention. This is highly relevant for other healthcare organizations aiming to combat issues like heavy workloads and shortages that undermine the nursing workforce. In the future, longitudinal measurement of governance perceptions may show that significant change can be achieved through carefully designed shared governance frameworks that make use of the tools and procedures this study has shown to be successful. Overall, restructuring toward shared models of nursing leadership holds promise for advancing practices that better engage and support bedside clinicians.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Ethical Approval

Ethical approval for this study was received from King Saud Medical City (IRB), Riyadh with IRB Registration Number with KACST, KSA: H-01-R-053 and IRB Registration Number U.S. Department of HHS IORG #: IORG0010374.

Conflicts of Interest

The authors declare no potential conflicts of interest concerning this article's research, authorship, and publication.

Authors' Contributions

All authors have contributed significantly and agree with the content of the manuscript.

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Research Article

Impacts of Job Demands on Turnover Intention Among Registered Nurses in Hong Kong Public Hospitals: Exploring the Mediating Role of Burnout and Moderating Effect of Pay Level Satisfaction

Ka Po Wong ^{1,2}, Bohan Zhang ², Yao Jie Xie ², Frances Kam Yuet Wong ²,
Claudia Kam Yuk Lai ^{2,3}, Shu-Cheng Chen ² and Jing Qin ²

¹Department of Applied Social Sciences, The Hong Kong Polytechnic University, Kowloon, Hong Kong, China

²School of Nursing, The Hong Kong Polytechnic University, Kowloon, Hong Kong, China

³Faculty of Medicine and Health Sciences, Yamaguchi University, Yamaguchi, Japan

Correspondence should be addressed to Bohan Zhang; bohan.zhang@connect.polyu.hk

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Background: High turnover rates and burnout are prevalent issues among registered nurses in public hospitals in Hong Kong. Pay level satisfaction is one of the crucial factors influencing organisational and professional turnover intention. Understanding whether pay level satisfaction can mitigate the negative impact of burnout on turnover intention can provide insights into the role of financial rewards in employee retention.

Objective: This study aims to evaluate the relationship between job demands and turnover intention among registered nurses in Hong Kong public hospitals. Additionally, it seeks to examine the mediating role of burnout and explore the potential moderating effect of pay level satisfaction on the relationship between burnout and turnover intention.

Methods: The study was a cross-sectional online survey of public hospital staff in Hong Kong. A total of 502 registered nurses who had worked at their employing facility for at least 6 months participated in this cross-sectional survey. Study variables included work overload, job stress, work–family conflict, family–work conflict, conflict with other nurses, burnout, pay level satisfaction and turnover intention. The collected data were analysed using bivariate Pearson correlation analysis and mediated moderation analysis with the PROCESS macro in SPSS 28.0.

Results: Burnout mediated the relationship between job demands, including work overload, job stress, work–family conflict, family–work conflict and conflicts with nurses, and organisational and professional turnover intention. Pay level satisfaction did not exert a moderating influence on the relationship between job demands and turnover intention through burnout mediating this relationship.

Conclusions: The importance of addressing job stress and burnout to mitigate turnover intention and promote nurse retention is underscored. Contrary to expectations, pay level satisfaction did not buffer the negative impact of job demands on turnover intentions via burnout. This suggests that compensation alone may not be sufficient to offset the detrimental effects of high job demands and burnout on nurses' intention to leave their jobs or the profession. Further research is warranted to explore potential moderators that may influence the relationship between job demands and turnover intention.

Keywords: burnout; job demands; job stress; pay level satisfaction; registered nurses; turnover intention

1. Introduction

Job demands for health have witnessed a significant increase worldwide due to the global phenomenon of rapidly ageing

populations and growing healthcare needs [1]. Hong Kong, like many other regions, grapples with the challenges posed by an ageing population, resulting in heightened job demands for nurses [2]. The shortage of nurses is a concern

shared by numerous countries, as a growing number of nurses approach retirement age or seek better career opportunities abroad. The aggregate number of registered practicing nurses and fresh nursing graduates grew by over 50%, rising from 43,698 in 2012 to 66,492 in 2022. However, it is projected that there will be shortages of 1383 and 1669 nurses in the years 2025 and 2030, respectively [2].

The healthcare industry is experiencing a shortage of manpower, coupled with escalating work demands, which has resulted in healthcare professionals working long hours and facing overwhelming workloads. Consequently, this has led to burnout and physical and mental exhaustion among healthcare professionals, ultimately increasing their intention to leave their positions [3]. The high turnover intention rate of registered nurses can have detrimental effects on the quality of patient care and the overall functioning of the healthcare system [1]. These repercussions include a lack of continuity of care for patients, increased workload in nurses who stayed, limitation of time nurses spending on each patient, increased healthcare cost, negative impact on employee morale and challenges in recruitment and staff orientation and training.

While there is a substantial body of literature on job demands, burnout and turnover intervention among healthcare practitioners, there is a notable gap in research focussing on the context of registered nurses within the Hong Kong public hospital setting. Previous studies, which are not limited to a specific geographical context, mainly focused on the intention to leave the profession. Little is known about the impact of job demands on the intention to leave the hospital. Existing research underexplored the moderating role of pay level satisfaction in the relationship between job demands, burnout and turnover intention. No cross-sectional study has been conducted to examine the direct and indirect effects of job demands on intention to leave hospitals and professions in registered nurses working in Hong Kong public hospitals. Hence, an empirical study is needed to explore the moderating effect of pay level satisfaction amongst registered nurses and provide valuable insights and potential solutions that can be adapted and implemented in healthcare systems facing similar workforce challenges. The findings of this study have the potential to inform policies and interventions aimed at improving nurse retention and enhancing the quality of patient care, not only in Hong Kong but also in other healthcare settings worldwide.

2. Background

2.1. Nexus of Job Demands, Burnout and Turnover Intention in Nursing. The nursing profession is grappling with a global challenge of elevated job demands, which have been identified as a significant factor contributing to burnout and turnover intention among employees. Job demands encompass the physical, mental and emotional efforts required to perform a job [4]. In the context of Hong Kong, registered nurses in public hospitals are particularly affected by high-demand workloads, as they are tasked with providing care for a large volume of patients [5]. Despite the international

recommendation of 9 nurses per 1000 people, Hong Kong falls slightly short with a ratio of 8.2 nurses per 1000 individuals [2, 6]. This shortfall contributes to excessive workloads, adherence to strict shift schedules, and the need for nurses to engage in training programs outside regular working hours [7, 8]. Factors such as long working hours, heavy workloads, inadequate staffing, and a lack of support for professional development have been cited as reasons for occupational turnover among nurses in Hong Kong [9].

The phenomenon of burnout and turnover intention is not unique to Hong Kong but is also observed in other regions. For instance, studies in China have shown a positive relationship between role demands and the intention to leave the hospital among frontline nurses [10], while South Korean nurses have demonstrated a positive association between burnout, emotional exhaustion and turnover intention [11]. Work–family conflict, where work responsibilities hinder the ability to meet family obligations, and family–work conflict, where family obligations impede work responsibilities, have both been positively associated with turnover intention [12–14]. Other studies have identified factors such as heavy workloads, relationships with physicians, full-time work schedules, burnout, and participation in hospital affairs as contributors to nurses' intention to leave the profession [15–17].

Burnout, a psychological response to chronic work stress, can mediate the relationship between job stress and turnover intention [18, 19]. It arises from continuous exposure to high patient volumes, complex medical cases, and emotionally demanding situations, leading to emotional exhaustion and detachment [20]. The mediating role of burnout on the impacts of job demands and family–work conflict on turnover intention has been demonstrated in various studies [21–24]. In addition to the direct impact of workload, nurses also face administrative tasks and interpersonal conflicts that can exacerbate job stress and reduce job satisfaction, potentially leading to turnover intention [25–27]. The implications of turnover intention are profound, affecting not only the healthcare system and continuity of patient care but also the well-being of nurses themselves [28]. Therefore, understanding and addressing the multifaceted nature of job demands is crucial for enhancing retention in the nursing profession, particularly in the high-pressure environment of Hong Kong's public hospitals.

2.2. Effect of Pay Levels Satisfaction on Nurses. Pay level satisfaction, which reflects an individual's subjective evaluation of their job compensation, has been recognised as a potential buffer against the negative effects of high job demands and burnout on nurses' turnover intentions [29, 30]. Studies across various regions have demonstrated the importance of pay satisfaction in the nursing profession. Wang et al. [31] found that pay satisfaction influenced geriatric nurses' turnover intentions both directly and indirectly. In China, Wang et al. [32] reported that wage satisfaction was a critical component of job satisfaction that negatively correlated with turnover intentions among

primary care providers. The finding of a negative relationship between pay satisfaction and turnover intention echoes the results reported by Wang et al. [31] in their investigation of geriatric nursing personnel in China. Internationally, Wardhani and Hariyati's [33] qualitative research in Indonesia revealed that pay growth played a significant role in nurse retention. High pay satisfaction may alleviate emotional exhaustion, a key aspect of burnout, thereby enhancing the ability to manage job demands and reducing the likelihood of turnover [34, 35]. Despite these insights, the moderating role of pay level satisfaction in the relationship between burnout and turnover intention remains under-explored. This study aims to fill this gap by examining whether pay level satisfaction can act as a counterbalance to the adverse effects of job demands and burnout on turnover intention, with a particular focus on the conditions faced by registered nurses in Hong Kong's public hospitals.

2.3. Theoretical Framework. The conceptual framework of this study (see Figure 1) was built upon the job demands-resources (JD-R) model proposed by Bakker and Demerouti [34]. This model suggests the interaction between job demands and job resources, where job demands are associated with negative effects on employee well-being, while job resources are associated with positive effects on employees [36]. Based on this model to explain the conceptual framework of this study, job demands refer to the physical and mental effort involved in work-related aspects. Specifically, job demands in our study include workload, job stress, work-family conflict, family-work conflict and conflict with nurses. These factors have been identified as significant dimensions within our research context and are crucial for understanding their impact on employee well-being and other outcome variables [4]. Burnout is the consequence of prolonged exposure to job demands and is the result of the imbalance between job demands and available resources [20]. The conceptual framework of this study proposes burnout as a mediator between job demands-related factors and turnover intention, while pay level satisfaction acts as a moderating factor. The study hypothesises that work overload, job stress, work-family conflict, family-work conflict and conflict with nurses will have direct positive effects on turnover intention and an indirect positive effect through burnout. Additionally, we postulated that pay level satisfaction will moderate the relationship between job demands-related factors, burnout, and organisational and professional turnover intention.

This study aimed to examine the conditional indirect effects of workload, job stress, work-family conflict, family-work conflict and conflict with nurses on organisational and professional turnover intention, with burnout serving as the mediator and to explore the moderating influence of pay level satisfaction in this relationship. This investigation was conducted using a two-step approach: (1) assessing whether the relationship between five job demands-related factors and organisational and professional turnover intention is mediated by burnout (i.e., mediation model) and (2) examining whether the strength of the mediated relationship is

moderated by pay level satisfaction (i.e., mediated moderation analysis). More specifically, it was hypothesised that the five components of job demands, namely, work overload, job stress, work-family conflict, family-work conflict and conflict with nurses, would have a positive direct effect on organisational and professional turnover intention. Additionally, it was hypothesised that burnout would mediate the relationship between the five job demands-related factors and turnover intention, exerting an indirect positive effect. It was asserted that pay level satisfaction would moderate the mediated relationship. Particularly, it was hypothesised that the direct and indirect relationship between the five job demands-related factors and organisational and professional turnover intention would be weaker when there was a high level of pay level satisfaction.

3. Methods

3.1. Design and Participants. The present study adopted a cross-sectional approach. Data were collected from registered nurses working at public hospitals in Hong Kong between October and December 2022. An online survey was randomly sent to the hospital executives or managers of the 43 public hospitals in Hong Kong. Ultimately, 13 public hospitals accepted the invitation. The purposes and the contents of the survey were demonstrated in the email and the first page of the online survey. The managers were asked to forward the online survey link to the nurses if they consented to be involved after reading the materials we sent. Participants' consent was confirmed by agreeing, completing and submitting the online survey. The online survey was made anonymous to preserve the confidentiality of the subjects' identities. Approval for the study was obtained from the Institutional Review Board of the authors' university (application number: HSEARS20220602001).

To be eligible for this study, participants should be (i) a registered nurse; (ii) currently working in a public hospital for at least 6 months; (iii) between the ages of 18 and 65; and (iv) able to read and write Chinese. Registered nurses who have worked in public hospitals for 6 months or more seem to be more familiar with the workings of the public healthcare system.

3.2. Measures. Job demands comprised five elements, including work overload, job stress, work-family conflict, family-work conflict and conflict with nurses. All items in the questionnaire were assessed by a seven-point response scale ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicated a higher level of job stress. Work overload was assessed by a five-item scale derived from Reilly's Role Overload Scale ($\alpha = 0.66-0.87$). The scale has been validated and widely applied [37]. Job stress is measured by four items adapted from the study of Graham et al. [38]. These items have been widely applied in assessing job stress amongst healthcare professionals [39, 40]. The Work-Family Conflict Scale (WAFCS), created by Haslam et al. [41], was the instrument used to gauge five work-to-family conflict items and five family-to-work conflict items.

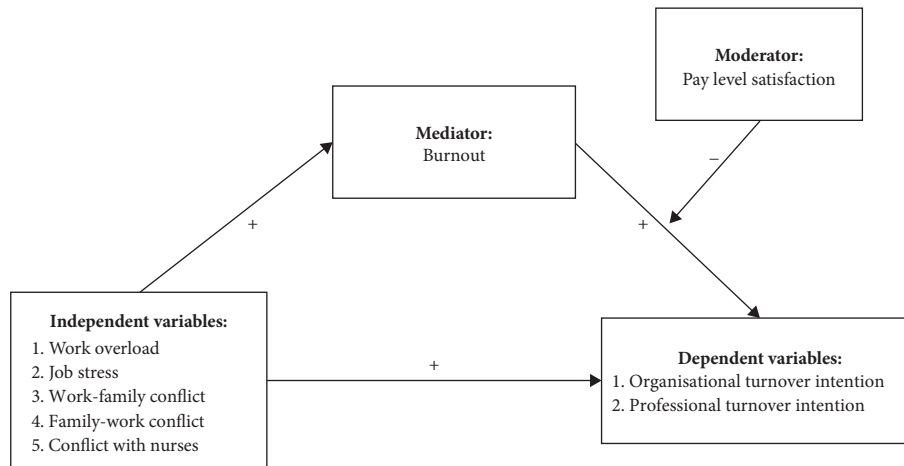


FIGURE 1: Study conceptual model.

The measure had a high internal consistency (work–family conflict: $\alpha = 0.84$) and (family–work conflict: $\alpha = 0.80$). Conflict with nurses was assessed by five items adapted from the Nursing Stress Scale developed by Gray-Toft and Anderson [42] ($\alpha = 0.7$).

Burnout was measured using six items adapted from the Maslach Burnout Inventory [43]. These six items were measured with a seven-point Likert scale which ranged from 1 (completely disagree) to 7 (completely agree). A higher rating indicated a higher level of burnout. This scale has been validated by Demerouti, Mostert and Bakker [44] and had a good internal consistency ($\alpha = 0.82$).

Pay level satisfaction was measured using five items adapted from Smith, Kendall, and Hulin [45] and Hackman and Oldham [46]. These five items were measured with a seven-point Likert scale which ranged from 1 (completely disagree) to 7 (completely agree). High scores indicated a high level of pay level satisfaction. The scale has a good internal consistency ($\alpha = 0.83$).

Turnover intention was assessed using two items, including “I do not want to continue working in this organisation” and another one was “I do not want to do this career.” These two items were adapted from the study of Yamaguchi et al. [47]. These two items were measured with a seven-point Likert scale which ranged from 1 (completely disagree) to 7 (completely agree). High scores indicated higher turnover intention.

A series of questions about demographic information such as age, gender, educational level, position and number of years since registration were included.

3.3. Data Analysis. The measurement model was verified through confirmatory factor analysis (CFA) using SPSS 28.0 and AMOS 28.0. CFA was conducted on the measurement model using SPSS 28.0 and AMOS 28.0 to assess its validity. Six goodness-of-fit indices were employed, namely, chi square to degree of freedom (χ^2/df), goodness-of-fit index (GFI), incremental fit index (IFI), comparative fit index (CFI), Tucker–Lewis Index (TLI), root mean square error of approximation (RMSEA), Parsimony goodness-of-fit index

(PGFI) and average variance extracted (AVE) [48]. The statistics analysis was performed using SPSS 28.0. The demographics of the participants were presented in descriptive analysis. The correlations between the participants’ demographics and study variables (job demands, burnout, pay level satisfaction and turnover intention) were examined by the bivariate Pearson correlation coefficient. The mediated moderation analyses were examined by PROCESS macro by Hayes [49]. The unstandardised coefficient beta and standard error for each path (between the study variables) were presented. This PROCESS macro tests the direct and indirect relationship between job demands and turnover intention and examines the mediator of burnout and the moderator of pay level satisfaction in this relationship. If significant moderating effects of pay level satisfaction were found, further moderating effects on different levels of pay satisfaction on turnover intention would be tested.

4. Results

4.1. Participant Characteristics. Table 1 demonstrates the description of participant characteristics. A total of 502 completed questionnaires were received from 13 hospitals. The study sample was comprised entirely of full-time registered nurses. Most of the participants were female (71.3%). The largest age group was those aged 30 to 40 (39.6%). 52.0% of the participants were single. 97.6% of the participants had a bachelor’s degree or above. The average year registered as a registered nurse was 13.1 (SD: 10.1) years. The average working hours per week was 46.5 (SD: 7.0) hours.

4.2. Results of Validity and Reliability of the Measurement Model. Table 2 shows the results of the validity and CFA of the measurement model. The values of AVE of all constructs ranged from 0.50 to 0.70 suggesting a good level of convergent validity. The values of χ^2/df , GFI, IFI, CFI, TLI, RMSEA and PGFI were 2.88 ($p < 0.001$), 0.92, 0.95, 0.95, 0.92, 0.06 and 0.70, respectively, satisfied with statistical standards [48]. Therefore, the measurement model presented satisfactory fit indices.

TABLE 1: Descriptive statistics of sample demographics and key variables ($N = 502$).

Nurse demographics		Frequency (%)	Mean (SD)	Range
Age	≤30	133 (26.5)	—	—
	>30–40	199 (39.6)	—	—
	>40–50	92 (18.3)	—	—
	>50	78 (15.5)	—	—
Gender	Male	144 (28.7)	—	—
	Female	358 (71.3)	—	—
Marital status	Single	261 (52.0)	—	—
	Married	234 (46.6)	—	—
	Divorced	7 (1.4)	—	—
Education	Diploma/higher diploma	12 (2.4)	—	—
	Bachelor's degree	201 (40.0)	—	—
	Master's degree	289 (57.6)	—	—
Years since registration		—	13.1 (10.1)	1.0–40.0
Years of working in this unit		—	7.8 (7.4)	0.4–35.0
Work departments	Cardiology	28 (5.6)	—	—
	Infectious disease department	11 (2.2)	—	—
	Intensive care unit	43 (8.6)	—	—
	Medical department	161 (32.1)	—	—
	Neurosurgery	2 (0.4)	—	—
	Obstetrics and gynaecology	53 (10.6)	—	—
	Oncology department	19 (3.8)	—	—
	Orthopaedics and traumatology	39 (7.8)	—	—
	Otolaryngology	11 (2.2)	—	—
	Paediatrics	54 (10.8)	—	—
	Surgery	38 (7.65)	—	—
Others	43 (8.6)	—	—	
Position	Registered nurse	335 (66.7)	—	—
	Advanced practice nurse/nursing officer	167 (33.3)	—	—
Average working hours per weeks (hours)		—	46.5 (7.0)	35–78
Need to raise children		174 (34.7)	—	—
No need to raise children		328 (65.3)	—	—
Need to take care of family members (in addition to children)		237 (47.2)	—	—
No need to take care of family members (in addition to children)		265 (52.8)	—	—
Living with family		453 (90.2)	—	—
Not living with family		49 (9.8)	—	—

Abbreviation: SD, standard deviation.

4.3. Correlations of Variables. The Spearman correlation coefficient was used since the data set did not exhibit a normal distribution according to the Shapiro–Wilk test. Table 3 presents the Spearman correlation between the variances. Work overload, job stress, work–family conflict, conflict with nurses and burnout were positively correlated with organisational and professional turnover intention. Pay level satisfaction was negatively correlated with organisational and professional turnover intention. There was no significant association found between nurses' experiences of family-interfering-with-work conflict and their reported plans to leave their current job or the nursing profession. Work overload, job stress, work–family conflict, family–work conflict and conflict with nurses were positively correlated with burnout. Work overload, job stress, work–family conflict, conflict with nurses and burnout were negatively correlated with pay level satisfaction and family–work conflict had no significant correlation with pay level satisfaction.

4.4. Mediated Moderation Analysis. Work overload, job stress, work–family conflict, family–work conflict and conflict with other nurses has a positive statistically significant impact on burnout (work overload: $B = 0.590$, $p < 0.001$; job stress: $B = 0.817$, $p < 0.001$; work–family conflict: $B = 0.581$, $p < 0.001$, family–work conflict: $B = 0.256$, $p < 0.001$; conflict with nurses: $B = 0.480$, $p < 0.001$) (Table 4).

Table 5 demonstrates the results of mediated moderation analysis of burnout and pay level satisfaction on the relationship between job demands-related factors and organisational turnover intention. Statistically significant associations were found between work overload ($B = 0.153$, $p < 0.028$), job stress ($B = 0.287$, $p < 0.014$) and conflict with other nurses ($B = 0.280$, $p < 0.001$) with organisational turnover intention. Additionally, family–work conflict ($B = 0.574$, $p < 0.001$) was positively associated with organisational turnover intention, while work–family conflict did not demonstrate a significant effect. Burnout was

TABLE 2: Validity of the measurement model.

Construct	Item	Factor loading	Average variance extracted	Composite reliability
Job demands	Work overload	0.69	0.50	0.83
	Job stress	0.70		
	Work–family conflict	0.81		
	Family–work conflict	0.78		
	Conflict with other nurses	0.51		
Burnout	Burnout 1	0.78	0.64	0.91
	Burnout 2	0.82		
	Burnout 3	0.77		
	Burnout 4	0.88		
	Burnout 5	0.83		
	Burnout 6	0.70		
Pay level satisfaction	Pay level satisfaction 1	0.85	0.70	0.92
	Pay level satisfaction 2	0.77		
	Pay level satisfaction 3	0.87		
	Pay level satisfaction 4	0.86		
	Pay level satisfaction 5	0.83		
Turnover intention	Organisational turnover intention	0.83	0.69	0.81
	Professional turnover	0.82		

TABLE 3: Spearman correlation of study variables.

	1	2	3	4	5	6	7	8	9	10
1. Average working hours per week	1.000									
2. Work overload	0.302**	1.000								
3. Job stress	0.311**	0.586**	1.000							
4. Work–family conflict	0.352**	0.531**	0.555**	1.000						
5. Family–work conflict	0.183**	0.202**	0.214**	0.413**	1.000					
6. Conflict with other nurses	0.111*	0.386**	0.322**	0.438**	0.290**	1.000				
7. Burnout	0.201**	0.495**	0.621**	0.639**	0.227**	0.504**	1.000			
8. Pay level satisfaction	-0.123**	-0.133**	-0.401**	-0.286**	-0.045	-0.171**	-0.354**	1.000		
9. Organisational turnover intention	0.162**	0.327**	0.481**	0.411**	0.061	0.409**	0.557**	-0.357**	1.000	
10. Professional turnover intention	0.028	0.339**	0.376**	0.363**	0.077	0.394**	0.454**	-0.245**	0.567**	1.000

** $p < 0.01$, * $p < 0.05$.

TABLE 4: Mediation analysis of burnout with work overload, job stress, work–family conflict, family–work conflict and conflict with other nurses.

Predictors	Burnout (M)		95% CI
	B	(SE) (95% CI)	
Intercept	-3.219**	(0.236)	-3.682, -2.755
Work overload	0.590**	(0.425)	0.507, 0.674
	$R^2 = 0.279$ $F = 193.248$, $p < 0.001$		
Intercept	-4.871**	(0.259)	-5.379, -4.363
Job stress	0.817**	(0.043)	0.733, 0.902
	$R^2 = 0.421$ $F = 363.731$, $p < 0.001$		
Intercept	-3.100**	(0.163)	-3.419, -2.780
Work–family conflict	0.581**	(0.030)	0.523, 0.639
	$R^2 = 0.436$ $F = 385.686$, $p < 0.001$		
Intercept	-0.933**	(0.143)	-1.213, -0.652
Family–work conflict	0.256**	(0.036)	0.184, 0.328
	$R^2 = 0.089$ $F = 48.833$, $p < 0.001$		
Intercept	-1.672**	(0.128)	-1.923, -1.421
Conflict with other nurses	0.480**	(0.034)	0.413, 0.548
	$R^2 = 0.282$ $F = 196.168$, $p < 0.001$		

Abbreviations: CI, confidence interval; M, mediator; SE, standard error.

** $p < 0.001$.

TABLE 5: Mediated moderation analysis of burnout and pay level satisfaction on the relationship between work overload, job stress, work–family conflict, family–work conflict and conflict with other nurses, and organisational and professional turnover intentions.

Predictors	B (SE)	95% CI
<i>Organisational turnover intention (Y)</i>		
Intercept	3.810** (0.383)	3.057, 4.562
Work overload	0.153* (0.069)	0.017, 0.289
Burnout	0.565** (0.068)	0.431, 0.699
Pay level satisfaction	−0.282** (0.048)	−0.377, −0.187
Burnout * pay level satisfaction	0.035 (0.039)	−0.041, 0.112
	$R^2 = 0.336$ $F = 62.727$, $p < 0.001$	
Intercept	2.925** (0.536)	1.872, 3.979
Job stress	0.287* (0.089)	0.112, 0.462
Burnout	0.512** (0.071)	0.373, 0.651
Pay level satisfaction	−0.240** (0.049)	−0.337, −0.143
Burnout * pay level satisfaction	0.021 (0.039)	−0.056, 0.097
	$R^2 = 0.343$ $F = 64.788$, $p < 0.001$	
Intercept	4.134** (0.339)	3.468, 4.801
Work–family conflict	0.094 (0.062)	−0.028, 0.216
Burnout	0.574** (0.073)	0.430, 0.718
Pay level satisfaction	−0.268** (0.049)	−0.364, −0.173
Burnout * pay level satisfaction	0.028 (0.039)	−0.049, 0.104
	$R^2 = 0.332$ $F = 61.781$, $p < 0.001$	
Intercept	4.995** (0.189)	4.623, 5.367
Family–work conflict	−0.096* (0.048)	−0.190, 0.018
Burnout	0.673** (0.061)	0.553, 0.792
Pay level satisfaction	−0.270** (0.048)	−0.365, −0.175
Burnout * pay level satisfaction	0.041 (0.039)	−0.036, 0.118
	$R^2 = 0.334$ $F = 62.415$, $p < 0.001$	
Intercept	3.665** (0.203)	3.267, 4.063
Conflict with other nurses	0.280** (0.055)	0.172, 0.388
Burnout	0.475** (0.066)	0.345, 0.605
Pay level satisfaction	−0.282** (0.047)	−0.375, −0.189
Burnout * pay level satisfaction	0.030 (0.038)	−0.045, 0.104
	$R^2 = 0.362$ $F = 70.562$, $p < 0.001$	
<i>Professional turnover intention (Y)</i>		
Intercept	2.501** (0.453)	1.611, 3.392
Work overload	0.253* (0.082)	0.092, 0.415
Burnout	0.497** (0.081)	0.339, 0.655
Pay level satisfaction	−0.160* (0.057)	−0.269, −0.044
Burnout * pay level satisfaction	0.019 (0.046)	−0.071, 0.110
	$R^2 = 0.218$ $F = 34.708$, $p < 0.001$	
Intercept	2.651** (0.642)	1.404, 3.858
Job stress	0.205 (0.107)	0.004, 0.414
Burnout	0.531** (0.085)	0.365, 0.698
Pay level satisfaction	−0.121* (0.059)	−0.237, −0.052
Burnout * pay level satisfaction	0.046 (0.046)	−0.087, 0.957
	$R^2 = 0.209$ $F = 32.888$, $p < 0.001$	
Intercept	3.177** (0.403)	2.384, 3.969
Work–family conflict	0.131 (0.074)	−0.014, 0.276
Burnout	0.531** (0.087)	0.360, 0.702
Pay level satisfaction	−0.137* (0.058)	−0.250, −0.023
Burnout * pay level satisfaction	0.008 (0.046)	−0.083, 0.099
	$R^2 = 0.208$ $F = 32.713$, $p < 0.001$	
Intercept	4.129** (0.226)	3.685, 4.572
Family–work conflict	−0.068 (0.057)	−0.180, 0.044
Burnout	0.646** (0.073)	0.503, 0.789
Pay level satisfaction	−0.143* (0.058)	−0.257, −0.030
Burnout * pay level satisfaction	0.019 (0.047)	−0.073, 0.111

TABLE 5: Continued.

Predictors	B (SE)	95% CI
	$R^2 = 0.206$ $F = 32.169$, $p < 0.001$	
Intercept	2.654** (0.240)	2.182, 3.126
Conflict with other nurses	0.351** (0.065)	0.223, 0.479
Burnout	0.415** (0.078)	0.261, 0.569
Pay level satisfaction	-0.154** (0.056)	-0.265, -0.044
Burnout * pay level satisfaction	0.010 (0.045)	-0.078, 0.099
	$R^2 = 0.247$ $F = 40.820$, $p < 0.001$	

Abbreviations: CI, confidence interval; M, mediator; SE, standard error; Y, outcome variable.

** $p < 0.001$, * $p < 0.05$.

found to have statistically significant mediating effects in all five relationships ($p < 0.001$). Pay level satisfaction had a statistically significant impact on organisational turnover intention ($p < 0.001$). However, pay level satisfaction did not demonstrate a significant moderating effect on the mediated relationship.

The results of the mediated moderation analysis, examining the influence of pay level satisfaction as a moderator on the relationship between job demands-related factors, burnout and professional turnover intention are demonstrated in Table 5. Work overload ($B = 0.253$, $p < 0.002$) and conflict with other nurses ($B = 0.351$, $p < 0.001$) showed statistically significant associations with professional turnover intention, while job stress, work-family conflict and family-work conflict did not exhibit a significant effect. Burnout was found to have statistically significant mediating effects in all five relationships ($p < 0.001$). Furthermore, pay level satisfaction showed a statistically significant impact on organisational turnover intention ($p < 0.05$). However, pay level satisfaction did not demonstrate a significant moderating effect on the mediated relationship.

Table 6 shows the results of the direct and conditional indirect effects of job demands-related factors on organisational turnover intention with the mediator of burnout and the moderator of pay level satisfaction. For the indirect effects of work overload, the indirect effect in the presence of the moderator, pay level satisfaction, at mean level, one standard deviation below mean and above mean were 0.333, 0.304 and 0.362, respectively, and per the bootstrap, that is within the confidence interval at a $p < 0.05$. Similarly, for job stress, the bootstrap analysis revealed significant effects at mean level, one standard deviation below mean, and one standard deviation above mean of pay level satisfaction (0.419, 0.395 and 0.442, respectively, $p < 0.05$). Work-family conflict also showed significant indirect effects on organisational turnover intention at the different levels of pay level satisfaction (0.333, 0.311 and 0.356, respectively, $p < 0.05$). The indirect effects of family-work conflict on organisational turnover intention were significant at mean level, one standard deviation below mean and one standard deviation above mean of pay level satisfaction (0.172, 0.158 and 0.187, respectively, $p < 0.05$). Conflict with other nurses had significant indirect effects on organisational turnover intention across the different levels of pay level satisfaction (0.228, 0.208 and 0.248, respectively, $p < 0.05$). The findings suggest indirect effect of work overload, job stress, work-family

conflict, family-work conflict and conflict with other nurses on organisational turnover intention through burnout is stronger or more pronounced when registered nurses have a higher level of satisfaction with their pay levels. The index of mediated moderation is not significant, indicating that the indirect effect is not moderated by pay level satisfaction.

Table 6 presents the results of direct and conditional indirect effects of job demands-related factors on professional turnover intention. Burnout serves as the mediator, and pay level satisfaction acts as the moderator. Considering the indirect effects of different factors on professional turnover intention, the bootstrap analysis shows that work overload has a significant indirect effect in the presence of pay level satisfaction at mean level, one standard deviation below mean and one standard deviation above mean (0.293, 0.277 and 0.309, respectively, $p < 0.05$). Similarly, job stress has a significant indirect effect on professional turnover intention across the different levels of pay level satisfaction (0.434, 0.429 and 0.439, respectively, $p < 0.05$). Work-family conflict demonstrates a significant indirect effect on professional turnover intention at mean level, one standard deviation below mean and one standard deviation above mean of pay level satisfaction (0.308, 0.302 and 0.315, respectively, $p < 0.05$). Likewise, family-work conflict shows a significant indirect effect on professional turnover intention across the different levels of pay level satisfaction (0.165, 0.159 and 0.172, respectively, $p < 0.05$). Moreover, conflict with other nurses has a significant indirect effect on professional turnover intention in the presence of different levels of pay level satisfaction (0.199, 0.192 and 0.206, respectively, $p < 0.05$). The findings suggest that indirect effect of work overload, job stress, work-family conflict, family-work conflict and conflict with other nurses on professional turnover intention through burnout is stronger or more pronounced when registered nurses have a higher level of satisfaction with their pay levels. The index of mediated moderation is not significant, indicating that the indirect effect is not moderated by pay level satisfaction.

5. Discussion

The present study's exploration of the mediating role of burnout in the relationship between work overload, job stress, work-family conflict, family-work conflict, conflict with nurses, and organisational and professional turnover intentions among registered nurses in Hong Kong's public

TABLE 6: Direct and conditional indirect effects of work overload, job stress, work–family conflict, family–work conflict and conflict with other nurses on the organisational and professional turnover intention with the mediator of burnout and moderator of pay level satisfaction.

Relationship	Direct effect B	Indirect effect		Index of mediated moderation B (95% CI)
		Level of pay level satisfaction	B (95% CI)	
Workload → burnout → organisational turnover intention	0.153*	(-1 SD)	0.304 (0.178, 0.436)	0.023 (-0.024, 0.067)
		(Mean)	0.333 (0.236, 0.438)	
Job stress → burnout → organisational turnover intention	0.286*	(+1 SD)	0.362 (0.254, 0.476)	0.032 (-0.047, 0.080)
		(Mean)	0.395 (0.228, 0.566)	
Work–family conflict → burnout → organisational turnover intention	0.094	(+1 SD)	0.419 (0.288, 0.559)	0.016 (-0.27, 0.061)
		(Mean)	0.442 (0.293, 0.600)	
Family–work conflict → burnout → organisational turnover intention	-0.096*	(-1 SD)	0.311 (0.194, 0.440)	0.011 (-0.010, 0.034)
		(Mean)	0.334 (0.238, 0.440)	
Conflict with other nurses → burnout → organisational turnover intention	0.280**	(+1 SD)	0.356 (0.245, 0.474)	0.014 (-0.020, 0.52)
		(Mean)	0.158 (0.100, 0.225)	
Workload → burnout → professional turnover intention	0.253*	(-1 SD)	0.172 (0.118, 0.235)	0.004 (-0.070, 0.074)
		(Mean)	0.187 (0.123, 261)	
Job stress → burnout → professional turnover intention	0.205	(+1 SD)	0.208 (0.115, 0.302)	0.004 (-0.048, 0.053)
		(Mean)	0.228 (0.159, 0.302)	
Work–family conflict → burnout → professional turnover intention	0.131	(-1 SD)	0.248 (0.170, 0.333)	0.005 (-0.017, 0.029)
		(Mean)	0.277 (0.134, 0.427)	
Family–work conflict → burnout → professional turnover intention	-0.068	(+1 SD)	0.293 (0.189, 0.405)	0.005 (-0.035, 0.046)
		(Mean)	0.309 (0.197, 0.419)	
Conflict with other nurses → burnout → professional turnover intention	0.065	(-1 SD)	0.429 (0.234, 0.634)	0.005 (-0.035, 0.046)
		(Mean)	0.434 (0.285, 0.591)	
Workload → burnout → professional turnover intention	0.131	(+1 SD)	0.439 (0.276, 0.602)	0.004 (-0.048, 0.053)
		(Mean)	0.302 (0.164, 0.441)	
Job stress → burnout → professional turnover intention	0.205	(-1 SD)	0.308 (0.201, 0.414)	0.004 (-0.048, 0.053)
		(Mean)	0.315 (0.195, 0.428)	
Work–family conflict → burnout → professional turnover intention	-0.068	(+1 SD)	0.159 (0.095, 0.232)	0.005 (-0.017, 0.029)
		(Mean)	0.165 (0.110, 0.229)	
Family–work conflict → burnout → professional turnover intention	0.065	(-1 SD)	0.172 (0.111, 0.241)	0.005 (-0.035, 0.046)
		(Mean)	0.192 (0.82, 0.310)	
Conflict with other nurses → burnout → professional turnover intention	0.065	(+1 SD)	0.199 (0.121, 0.282)	0.005 (-0.035, 0.046)
		(Mean)	0.206 (0.126, 0.288)	

Abbreviations: CI, confidence intervals; SD, standard deviation.
** $p < 0.001$, * $p < 0.05$.

hospitals has yielded significant insights. We can gain a better understanding of the complex interplay between job demands-related factors and burnout and turnover intentions, thereby enhancing our knowledge of the challenges faced by nurses and the potential strategies for improving retention in the nursing profession by delving deeper into the results.

Our findings highlight the mediating role of burnout in the relationship between the five factors of job demands and organisational and professional turnover intentions. These are consistent with previous studies that determined burnout as the response to job demand, job stress, work overload, work–family conflict, family–work conflict and poor relationship with colleagues [18, 50–52]. Moreover, our findings confirm that the intention to leave both the current job and the nursing profession can be attributed to burnout among nurses [15, 22].

The study revealed significant effects of work overload, job stress and conflicts with nurses on organisational turnover intention. Work overload and conflicts with nurses were found to have significant effects on professional turnover intention. Remarkably, conflict with other nurses emerged as the primary and most prominent correlate, influencing both organisational and professional turnover intentions. These findings match the earlier studies that workloads are the driving factors of nurses' organisational and professional turnover intentions [12, 53]; nurses' job stress leads to the intention to leave the hospitals [54, 55]; conflict with colleagues increases the intention to leave the hospitals and occupation [54, 56]. Reinhardt et al. [57] found that better relationships with colleagues improved retention amongst registered nurses in the United States. These results corroborate the established understanding that burnout acts as a critical mediator between job demands-related factors and organisational as well as professional turnover intentions, aligning with the theoretical framework posited by the JD-R model [34].

Contrary to previous studies [29, 58], pay level satisfaction did not moderate the relationships between job demands-related factors, burnout, and organisational and professional turnover intentions. These unexpected results may be due to uniform pay structure, perceived fairness of pay systems and policies, nonfinancial factors and cultural norms and values. A standardised salary scale for registered nurses may limit variability in pay levels across the labour [59]. There may not be enough variation in pay level satisfaction to detect a significant moderating effect when most registered nurses receive similar pay under this pay system. A transparent pay system may lead to perceptions of fairness and pay equity [59–61]. This may diminish the moderating effect of pay level satisfaction on the job demands–turnover intention relationship. Further, nonfinancial factors, such as job autonomy, supportive work environments or professional development opportunities, which may be more influential in determining nurses' turnover intention among nurses, might overshadow the impact of pay level satisfaction as a moderator [62]. Cultural norms and values, such as a strong work ethic, could be a prioritising factor in determining the intention to leave [63, 64].

According to the JD-R model, pay level satisfaction is expected to buffer the negative effects of job demands on turnover intention [65]. However, if the employee perceived their job demands as compensated by adequate pay, the moderating effect of pay level satisfaction might be diminished. In this case, the nurses may perceive other job resources, such as social support and career development opportunities, as compensation for high job demands [66]. For instance, the meta-analysis of Kim and Kim [11] showed that factors other than salary, including interpersonal relationships, social support, organisational justice and person–organisational fit, were significantly and negatively associated with turnover intention amongst nurses in South Korea. As a result, the moderating effect of pay level satisfaction may be attenuated. The specific reasons for the lack of moderation effect of pay level satisfaction in the given context would require empirical investigation and further research to provide more concrete explanations.

It is somewhat surprising that family–work conflict had negative impacts on organisational and professional turnover intention, while work–family conflict had no significant association with organisational and professional turnover intention. Extensive research has shown that work–family conflict and family–work conflict predict the nurses' intention to leave the hospitals and profession [47, 67, 68]. This finding may reflect a complex interplay of personal and professional values, cultural expectations and life-stage considerations that influence turnover decisions. It is possible that for the younger, predominantly single nurses in this study, professional aspirations and career progression may take precedence over family obligations, thus reducing the impact of family–work conflict on their turnover intentions. Our demographic analysis revealed that younger caregivers in our study (under 30 years old) were more likely to be single and without dependent children. This suggests that family obligations may be less important for this group than for older, married/partnered individuals. Further qualitative research could provide richer insights into these personal and cultural factors that shape nurses' work-life integration and turnover behaviour.

Regarding practical implications, this study highlights the significance of addressing conflict with other nurses. Conflict with colleagues emerged as the primary and most prominent factor in organisational and professional turnover intention. Healthcare organisations should prioritise interventions aimed at promoting effective communication, collaboration and conflict resolution among nursing staff. Creating a positive work environment that fosters teamwork and mutual respect can help mitigate conflicts and reduce turnover intentions. Furthermore, the study underscores the importance of managing work overload. Healthcare organisations should explore strategies to effectively manage workloads, such as workload redistribution, task prioritisation and resource allocation. By addressing work overload, healthcare organisations can alleviate the burden on nurses and enhance job satisfaction, ultimately reducing turnover intentions. Additionally, the findings emphasise the role of burnout as a mediating factor. The study identified statistically significant mediating effects of burnout in all five of

the relationship dynamics that were explored. To mitigate burnout among nursing staff, healthcare organisations should prioritise interventions aimed at preventing and managing burnout. This may include providing resources for stress reduction, promoting self-care practices and offering emotional support to nurses. By addressing burnout, healthcare organisations can improve job satisfaction and reduce turnover intentions.

This research further accentuates how family-interfering-with-work conflict can shape nurses' considerations of quitting their organisation. Healthcare organisations should recognise and address the challenges faced by nurses in balancing their work and family responsibilities. Implementing family-friendly policies, flexible work arrangements and support systems for childcare or eldercare can help reduce family-work conflict and mitigate turnover intentions among nursing staff. However, it is important to note that pay level satisfaction did not demonstrate a significant moderating effect on the relationship between job demands-related factors and burnout and turnover intentions. Therefore, healthcare organisations should adopt a comprehensive approach that considers various factors, including work environment, workload management, interpersonal relationships and support systems, in addition to fair compensation. This multifaceted approach should go beyond salary adjustments and encompass strategies such as mentorship programs, career development pathways and wellness initiatives that target burnout prevention. By considering these multiple factors, organisations can create an environment that supports nurses' well-being and reduces the likelihood of turnover. Taking a holistic approach to nurse retention will foster a positive work environment and promote the long-term satisfaction and commitment of registered nurses in the healthcare sector.

5.1. Limitations and Future Research Directions. This study contains several limitations. First, the cross-sectional design limited the ability to establish causal relationships between study variables. To provide more robust evidence of causality by capturing changes in variables over time, future research is encouraged to employ longitudinal designs. This approach would enable a deeper understanding of the temporal dynamics and causal pathways involved. Second, it is important to note that the participants in this study consisted of registered nurses from public hospitals in Hong Kong. Thus, caution should be exercised when generalising the findings to other contexts, such as private hospitals or healthcare systems in different countries. Further investigations should encompass diverse healthcare settings and populations to enhance the generalisability and external validity of the results. Third, the present study did not include certain variables that may exert influence on the examined relationships. Variables such as organisational culture, social support, and job autonomy are recognised as potential factors in the complex interplay between work-related elements and burnout and turnover intentions. Incorporating these additional variables in future research endeavours

would yield a more comprehensive understanding of the phenomenon and enable the identification of additional factors that contribute to the outcomes of interest.

To advance the current knowledge in this field, future research should explore multiple avenues. First, employing longitudinal designs would aid in understanding the long-term effects of work-related factors on burnout and turnover intentions, as well as uncovering causal mechanisms. Second, including a wider range of variables such as organisational culture, social support, job autonomy, and other relevant psychosocial factors would provide a more comprehensive understanding of the complexities involved. Additionally, expanding the investigation to encompass different healthcare contexts, both nationally and internationally, would enhance the applicability and external validity of the findings. Moreover, qualitative research methods, such as interviews or focus groups, could be used to gain in-depth insights into nurses' experiences and perspectives concerning work-related factors and burnout and turnover intentions. These qualitative approaches would complement the quantitative findings and offer a deeper understanding of the underlying mechanisms.

6. Conclusions

The study was to determine the mediating effect of burnout and the moderating effect of pay level satisfaction in the indirect effect of job demands on turnover intention. The findings highlight the detrimental impact of work-related factors, such as work overload, job stress and conflict with other nurses, on nurse burnout and turnover intentions. While pay level satisfaction was negatively correlated to turnover intention, the lack of a significant moderating effect suggests that addressing burnout and turnover intentions requires a comprehensive approach that goes beyond focussing solely on pay satisfaction. Public hospitals should consider implementing strategies that tackle multiple factors contributing to burnout. The findings emphasise the need for healthcare organisations and policymakers to prioritise interventions aimed at reducing work-related stress and burnout among registered nurses in public hospitals in Hong Kong. By addressing these factors and fostering a supportive work environment, healthcare organisations can promote nurse well-being, mitigate turnover intentions and contribute to the overall quality of patient care.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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Research Article

Implementation of Pharmaceutical Technical Assistants on Hospital Wards and Their Impact on Patient Safety and Quality of Care: A Qualitative Study on Nurses' Experiences and Perceptions

Marjan De Graef ^{1,2,3}, Brecht Serraes ¹, Veronique Van Rompay,¹
Nienke E. Dijkstra ^{2,4}, Eibert R. Heerdink ^{2,4,5} and Tinne Dilles ^{2,3}

¹Clinical Nursing and Allied Health Research and Development Group (CNuAH-RD), Nursing and Paramedical Department, Vitaz Hospital and Health Care, Moerlandstraat 1, Sint-Niklaas 9100, Belgium

²NuPhaC, Nurse and Pharmaceutical Care Consortium, Universiteitsplein 1, Wilrijk 2610, Belgium

³Department of Nursing Science and Midwifery, Centre for Research and Innovation in Care (CRIC), Faculty of Medicine and Health Sciences, University of Antwerp, Universiteitsplein 1, Wilrijk 2610, Antwerp, Belgium

⁴Research Group Innovations in Healthcare Processes in Pharmacology, University of Applied Sciences Utrecht, P.O. Box 12011, 3501 AA, Utrecht, Netherlands

⁵Division of Pharmacoepidemiology and Clinical Pharmacology, Utrecht Institute for Pharmaceutical Sciences, Utrecht University, P.O. Box 80082, 3508 TB, Utrecht, Netherlands

Correspondence should be addressed to Marjan De Graef; marjan.degraef@vitaz.be

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Object. To explore nurses' experiences and perceptions of implementing pharmaceutical technical assistants on hospital wards for medication dispensation. The study focuses on implementation, role development, and impact on safety and quality of care, identifying critical success factors and improvement opportunities. **Methods.** In a qualitative descriptive study, between December 2022 and March 2023, 16 semistructured interviews were carried out with a stratified purposive sample of nurses across internal, surgical, and geriatric wards. The inclusion criteria required a minimum of six months of work experience and experience working both day and night shifts. Inductive thematic analysis was performed in NVivo 1.6.1. **Results.** Semistructured interviews revealed three main themes: (1) patient safety and quality of care, (2) organization of care, and (3) role development and collaboration. The implementation of pharmaceutical technical assistants on nursing wards was perceived to reduce the risk of medication errors without compromising care quality, allowing nurses to spend more time on direct patient care. Clear communication procedures were vital for successful implementation, highlighting the need for collaboration and information exchange between pharmaceutical technical assistants and nurses. Continuity in assigning pharmaceutical technical assistants was highlighted as crucial to improve medication safety and quality of care. This is considered an important aspect to ensure a smooth and optimal cooperation between nurses and pharmaceutical technical assistants. Nurses expressed that working with pharmaceutical technical assistants challenged their supervisory role and teamwork dynamics. **Conclusions.** Nurses confirmed the added value of pharmaceutical technical assistants in medication management. Critical factors included dedicated assignments to hospital wards, clear roles, and mutual expectations in collaboration with ward nurses.

1. Introduction

The medication process on hospital wards is a routine but complex activity, involving multiple steps (prescription, dispensation, preparation, double-checking, administration,

and evaluation) and various healthcare professionals. However, a critical workforce crisis is growing, with a projected global shortage of 7.2 million healthcare professionals expected to increase to 12.9 million by 2030, including a shortfall of 5.9 million nurses [1, 2]. Nurses have a unique

role in medication administration [3, 4]. In the medication process, there are specific actions for nurses (such as administering), but there is also overlap in actions that can be performed by other healthcare professionals (e.g., dispensing and preparing).

At the dispensing and administration stage, errors are common (32–38% of all medication errors that harm patients) [5]. Medication errors are defined as preventable events that (have the potential to) harm the patient [6]. Medication errors can be caused by structural factors in nursing practice, including high workload, stressful environments, distractions, multitasking, and interruptions [7–10]. Sheik et al. [11] found disruptions during patient care contribute to half of hospital medication errors in patient files.

Studies suggest that pharmaceutical technical assistants (PTA) can contribute to hospital wards to a substantial improvement of medication dispensation [12–15]. Beyond dispensing, PTAs may perform other roles in a hospital. A literature review suggests that through the use of PTAs within medication reconciliation, hospitals experienced cost savings and other healthcare professionals saved time for other patient care activities, as well as increased trust in the accuracy of medication history [16].

A general hospital in Belgium, Vitaz, implemented PTAs to achieve high-quality medication service and allow nurses, physicians, and pharmacists to practice at the highest level of their licence. Between January 2021 and June 2022, ten PTAs were assigned to six hospital wards from Monday through Friday. Each PTA had two hours of daily medication dispensing and making stock corrections for the coming 24 hours. Nurses remained responsible for medication control and administration to patients [17].

Implementing PTAs on hospital wards can improve medication dispensation. Studies reveal that nurses, involved in direct patient care, experience more interruptions than PTAs. This allows PTAs to focus on dispensing medication [15, 18]. The main reason for implementing PTAs on hospital wards is to improve the job characteristics of nurses by reducing their workload and releasing additional time for direct patient care [15]. The integration of PTAs changes the organizational structure of a hospital ward, which can contribute to avoiding medication errors. Furthermore, this integration may lead to job enrichment and job satisfaction of the hospital PTAs [19, 20].

The PTA in Belgium, recognized since 1997, is a paramedic professional who is responsible for the dispensation of medication under the supervision of a pharmacist. Education, with at least 300 hours of practical internship in a pharmacy, is scaled to level 4—technical secondary education in the European qualification framework and the International Standard Classification of Education [21, 22]. A Belgian PTA is certified to perform acts, such as receiving and registering prescriptions, medication delivery, informing patients about adequate and safe use, making preparations, and training PTAs [23].

To evaluate and improve the role and implementation of PTAs on the hospital ward, nurses are key stakeholders. Nurses experience changes in organizational structure on

a daily basis, can detect potential risks, and suggest improvements. This study aimed to explore nurses' experiences and perceptions of the implementation of PTAs on hospital wards to support the medication dispensation process, role development, and impact on safety and quality of care to determine critical success factors and opportunities for quality improvement.

2. Methods

2.1. Study Design, Setting, and Period. A qualitative study with individual semistructured interviews took place on hospital wards (December 2022–March 2023). These wards had PTAs assigned during this study or between January 2021 and June 2022.

2.2. Participants and Sample Procedure. In this study, 16 semistructured interviews were carried out with a stratified purposive sample of nurses across internal, surgical, and geriatric wards. The inclusion criteria required a minimum of six months of work experience and experience working both day and night shifts. Participants were informed about the study through written and oral communication, including e-mail, telephone, and face-to-face interactions. Data saturation was assessed through consensus among the project group members (MDG, BS, TD, RH, and ND) and was achieved after conducting 16 interviews.

2.3. Data Collection. The interview guide was informed by a review of the literature on the roles of PTAs on hospital wards. Open-ended questions aimed for participants to freely express their personal experiences on organization, work environment, collaboration, role development, criteria, and potential benefits of the implementations of PTAs on hospital wards. The interview guide was discussed and refined at regular project group meetings. All interviews were conducted by MDG or VVR, audio recorded, pseudonymized, and transcribed verbatim. The interviews were held in a separate and quiet room. The accuracy of the transcripts was reviewed by proofreading by the two researchers. To describe the population, the following demographic data were collected: sex, age, education level, years of experience, and current job time.

2.4. Data Analysis. Inductive thematic analysis was conducted in NVivo 1.6.1 to uncover emerging patterns and (sub)themes from the data. Two researchers (MDG and VVR) independently coded the data to enhance the credibility of the findings. After analysing the first four interviews, the researchers held a cross-check meeting to ensure consistency in coding strategies and refine approaches, such as clustering codes and formulating (sub)themes. This iterative process continued throughout data collection, with a final meeting held when both researchers independently reached data saturation, indicating that no new themes were emerging. To mitigate potential biases in data gathering, analysis, and reporting, the preliminary analysis findings

were presented to the project group for further discussion. Finally, to ensure a thorough exploration of the identified themes and subthemes, all project group members engaged in comprehensive discussions until consensus on the final thematic framework was achieved.

2.5. Credibility and Trustworthiness. Data triangulation involved a meticulous cross-validation process. To allow critical and sense-making discussion of data interpretations, regular cross-check meetings between the two researchers were held. In addition, discussions within the project group provided a valuable collaborative perspective that served to validate the findings and mitigate potential bias. After the analysis, the findings were presented to the participants using a thematic presentation of the themes. The participants discussed these findings to reduce the risk of superficial or false interpretation and confirmed that the quality of data analysis was rigorous and reliable. This interactive dialogue provided a deeper exploration of the participants' experiences and insights, reducing the risk of superficial or false interpretations, and ensured that the data analysis was embedded in the participants' experiences.

2.6. Ethical Considerations. The study adhered to the Declaration of Helsinki and received approval from the Ethics Committee of Vitz (registration number EC/22054) [24]. The study was reported according to the Consolidated Criteria for Reporting Qualitative Studies (COREQ) checklist for qualitative research [25].

3. Results

Seven head nurses and nine nurses were interviewed for a total of 347 minutes, with a mean duration of 21.7 minutes (range 18–29) per interview. The majority of the interviewees were females ($n = 11$, 69%), with a mean age of 40.8 years, and 13 (81%) participants had more than five years of work experience (Table 1).

Nurses had a positive perception of the implementation of PTAs to support the process of medication management on hospital wards. All participants endorsed the content, formulation of themes, and deeper insights in the thematic presentation and discussion of the themes. Substantial changes were not required after this presentation. The analysis identified three main themes: (1) organization of medication management by PTAs, (2) patient safety and quality of care, and (3) role development and collaboration (Figure 1). These main themes are divided into several subthemes and described hereafter.

3.1. Organization of Medication Management by PTAs. In terms of the organization of medication management by PTAs on the hospital ward, five subthemes were described by nurses' experiences: (1) work instructions, (2) moment and place medication preparation, (3) continuity of the assignment of PTAs, (4) management medication stock, and (5) communication.

TABLE 1: Participants' characteristics.

Characteristics of nurses ($n = 16$)	n (%) / Mean (range)
Gender	
Male	5 (31)
Female	11 (69)
Age, mean (range), y	40.8 (24–58)
Educational level	
EQF and ISCED-P* level 5	11 (69)
EQF and ISCED-P* level 6	5 (31)
Work experience	
6 months < 5 y	3 (19)
5–10 y	2 (12)
>10 y	11 (69)

*EQF: European Qualification Framework and ISCED: International Standard Classification of Education 2011.

3.1.1. Work Instructions. Nurses mentioned misunderstandings of PTAs' responsibilities due to unclear insight of PTAs' time on the ward. Nurses emphasized the need for clear and well-defined work instructions for optimal medication dispensation. These work instructions are fundamental for all healthcare professionals to understand and set expectations for PTAs on the hospital ward.

Nurse 5: "Sometimes there are misunderstandings. Like the other day, our PTA said they are not allowed to take from the home medication to prepare. But those are things we as nurses don't know, unless we verify it with our pharmacist."

Nurse 13: "They actually prepare all the medication according to the medication program. I don't think there are really concrete agreements."

3.1.2. Moment and Place Medication Dispensation. The timing and location of the medication dispensation by PTAs emerged as a notable consideration in the organization of the medication dispensation on the hospital ward. At the initial start of the implementation of PTAs, they performed their tasks on the hospital ward in the afternoon. Later, to be able to provide more hospital wards with this pharmacy service, the organization made operational adjustments by sending PTAs to some hospital wards in the morning.

Nurse 3: "It's always busy in the same rooms. That place is too small and everything comes together. The telemetries go off constantly, nurses come there to wash their hands, the shift change, etc. There should be walls, a really separate room, that would make a difference. In fact, that's how it should be to prepare medication in completely enclosed rooms."

Participants indicated that the moment of medication dispensation by the PTAs influences the workload of nurses and their ability to provide direct patient care. When PTAs dispense the medication for the following day in the morning, there is a higher risk of medication changes than when this is done in the afternoon, especially after the

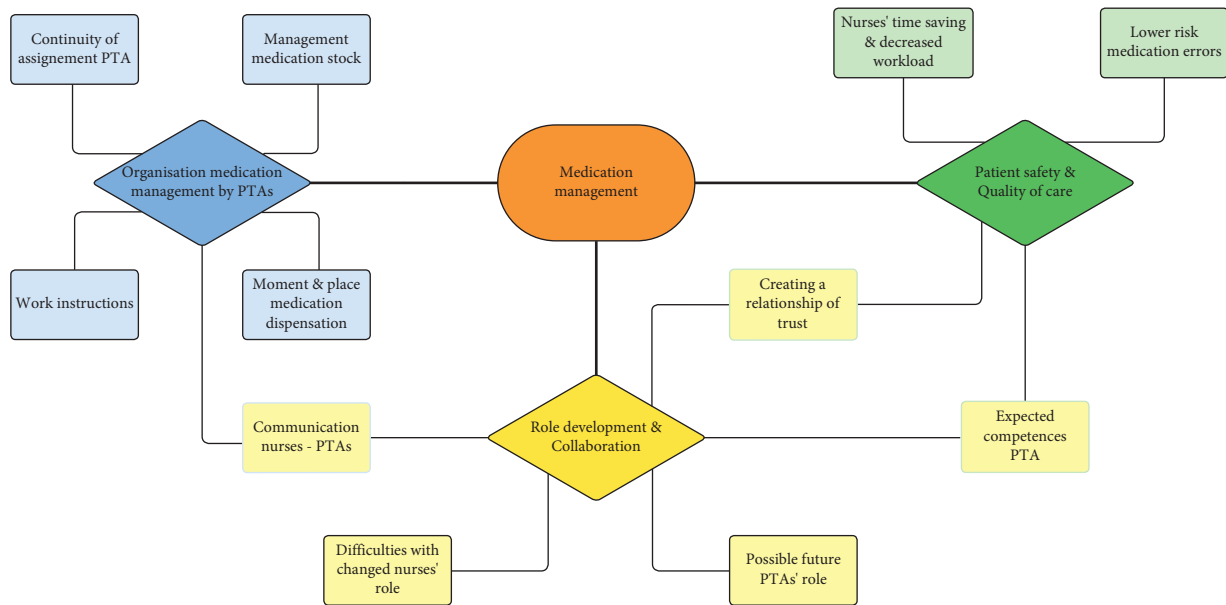


FIGURE 1: Main themes and interconnected subthemes of nurses' perception of the implementation of PTAs to support the medication management process on hospital wards.

doctor's round, when medication use is evaluated. Nurses mentioned that greater awareness of the moment of medication dispensation by PTAs is critical to prevent night nurses from spending, again, additional time supplementing and reviewing the medication dispensed by PTAs. Careful consideration of the optimal time for medication preparation by PTAs is crucial to maintain quality of care, minimize interruptions, and reduce the risk of medication discrepancies.

Nurse 15: "At this point they come to prepare in the morning, if an emergency admission occurred the day before, you have not received medication yet, because it does not arrive until the afternoon. If the doctor prescribes something in the morning, they have not seen it, because they have been there before the doctor has made all the adjustments. . . Things are really not going well on the ward at the moment."

To achieve high-quality medication dispensation, participants mentioned the importance of an enclosed, quiet medication room on the hospital ward. These environmental conditions were seen as essential elements to concentrate and perform their tasks with precision. The quiet condition not only allowed the PTAs to focus on their task but also served as a protective barrier against distractions or interruptions, which can potentially contribute to medication errors.

3.1.3. Continuity of Assignment PTAs. The continuity of assignment in terms of daily allocation of PTAs and in terms of the medication management process recurred frequently throughout the interviews. PTAs can be allocated to different wards every day; however, all participants perceived that the structural allocation of PTAs to the same hospital wards could have many advantages. The potential benefit of this

approach is a closer and more collaborative relationship, effectively forming a unified team that aims to build trust between nurses and assigned PTAs. In addition, nurses highlighted that when PTAs are consistently assigned to the same hospital wards, they have the opportunity to improve their clinical reasoning skills, which may contribute to the quality of care delivered.

Nurse 3: "The biggest frustration of nurses: we are here 24/7 and every discipline that comes to support us is limited."

Different opinions arise on the availability of PTAs during the week or weekends. Some express frustration over the fact that PTAs are only available on weekdays when nursing care is a requirement 24/7. On the contrary, other participants are of the opinion that PTA support might not be as essential during weekends and holidays, noting a perceived decrease in workload. Participants indicated that these varying perspectives are often linked to the unique needs of individual hospital wards. Surgical wards, for example, tend to experience a higher patient turnover during the week compared to weekends and holidays, leading to a lower workload on weekends and holidays. Geriatric wards often experience continuous bed occupancy, maintaining a consistent workload throughout the week, unaffected by specific days.

Nurse 5: "Especially during the week, because on the weekends you have fewer patients, normally, and on the other hand, speaking for myself, you are pulling the strings yourself again."

Nurse 11: "It would be easier if you have someone specific, or a couple of pharmacy assistants, who alternate specific on your hospital ward. Because you don't see someone else every day, but you can build a relationship of trust."

3.1.4. Management Medication Stock. Most nurses agreed that the introduction of PTAs improved the accuracy and efficiency of medication stock management on the hospital ward. PTAs overseeing this aspect reduced nursing time spent on frequent pharmacy calls for dispensing, restocking, or addressing missing medications. However, it is important to note that not all nurses shared the same perspective. Some nurses believed that PTAs could improve their role by ensuring that the necessary medications for the next 24 hours are in stock on the ward. This perspective emphasizes the ongoing pursuit to refine the balance between medication stock management and anticipating the specific needs of the ward.

Nurse 3: “Make sure that your antibiotics or important medications are in stock for the first 48 hours, so that the next shift does not have to call ‘we’re on our last medication’.”

Nurse 16: “If they see that we have shortages in the closet, they pass it on to their colleagues and then that medication comes faster to the hospital ward. I have to call a lot less to the pharmacy to tell them there is a shortage of medication stock. That’s something I really notice.”

3.1.5. Communication between Nurses and PTAs. The subtheme “communication” not only plays a vital role in organizing medication management, but also has far-reaching implications for role development and collaboration. All participants mentioned that effective communication between nurses and PTAs is essential to ensure patient safety and effective implementation.

To improve adequate communication between PTAs and nursing staff and mitigate the risk of medication errors, the hospital introduced a communication tool called “medication-attention cards.” These cards were designed to be placed within patient medication trays, highlighting crucial information, such as missing doses (ordered by hospital pharmacy), multidose medications, or medications on a medication strip. However, most of the participants expressed doubts about the effectiveness of this approach. There was often uncertainty about interpreting these medication-attention cards, and their inclusion was seen to potentially clutter and confuse the medication tray. On the contrary, nurses noted the critical need for a simplified and efficient method to facilitate the exchange of medication information between PTAs and nursing staff.

Nurse 2: “There are often little cards inside, pink, blue, and yellow. . . That means something like multidose medication, like insulin. But we don’t really know exactly what those cards mean, what medication they are about.”

Nurse 15: “That pink one, that is for the ordered medication. If the pharmacy has already seen it but does not have it, they place that to draw attention to the night nurse, ‘here should be an additional pill’.”

3.2. Role Development and Collaboration. This theme is divided into five subthemes: difficulties with changed nurses’ role, team, communication, competencies of PTAs, and possible future PTAs’ role.

3.2.1. Difficulties with Changed Nurse’s Role. The implementation of PTAs into the medication dispensation process represents a substantial task shift and introduces role differentiation between PTAs and nurses. This transition led to a decrease in overall workload; an improvement acknowledged by all participants. However, an interesting and nuanced perspective emerged among some participants who found it challenging to completely disengage from medication dispensation responsibilities, particularly during the night shift. These participants mentioned a sense of responsibility to ensure the accuracy of medication dispensation for their colleagues who worked the following day. This feeling of accountability extended to maintaining a clear overview of their patients’ medication regimens, recognizing their critical role in intercepting potential errors in medication prescriptions, especially concerning oral and subcutaneous anticoagulant, double antibiotics, etc. In addressing these concerns, many participants indicated a practice they adopted during the night shift: a “quick check” of medications dispensed by PTAs. This creates an additional third check before the medication reaches the patient. Although this is an additional and unattended step, this improvised verification process was perceived to provide an additional layer of medication safety.

Nurse 12: “Like today, the morning shift has already prepared half of the medication and the evening shift is going to complete the other half, so the night shift can be reassured: they only have to perform a last check and prepare the medication for new admissions.”

Exactly for that reason, several participants mentioned their willingness and even satisfaction with the responsibility of dispensing medication on weekend and holiday nights. This allowed them to periodically review and maintain a clear medication overview, minimizing the potential risk of losing track of medication details. In essence, it provided a resource for nurses to address proactively any discrepancies or potential errors in medication prescriptions, reaffirming their commitment to patient safety. Interestingly, there are also certain hospital wards where day nurses now undertake the task of medication dispensation for the following day when there are no PTAs available to support them.

Nurse 15: “We are much less aware of the medications the patients are taking. As a night nurse you sometimes see things like ‘he is taking that and that together’ or ‘he complains about that, but he gets this and this’. we miss that a bit by not preparing it anymore. Of course, at busy times we are happy that it is already done, but sometimes

we miss not having a good overview of patients' medication. Some things are important to keep in mind."

3.2.2. Creating a Relationship of Trust. The participants mentioned the importance of assigning PTAs to the same hospital wards as an important factor for closer collaboration and integration into the healthcare team. The participants perceived that when the same PTAs worked on their hospital ward, they could learn to know each other and begin building a relationship of trust. However, all participants indicate that there is pleasant contact with the PTAs, and they do not have the feeling to be one team. Although PTAs have a uniform way of working on all the different hospital wards, participants appreciate it when PTAs make small adjustments in their working methods to accommodate the habits of the ward. For example, a hospital ward has the habit of using medication jars with different colours for each moment of the day. On this ward, PTAs and nurses agreed to prepare the medication for the next day in coloured jars, provided that the nurses already had the jars ready to go.

Nurse 1: "They should be part of your team. I know we will not be the only team. I think they will probably work on two or three hospital wards. It is a matter of creating that bond of trust and that includes communication. That is just the way it is, and that trust needs to be created. That is something that needs to grow, you cannot force it."

Nurse 14: "Unfortunately, it doesn't seem like that, it seems a bit separate. But actually, I think that, if you work with permanent people, they will really become a part of the team."

3.2.3. Communication between Nurses and PTAs. All participants perceived that effective communication among various healthcare professionals is the key to successful working collaboration. They recognized four important aspects of communication: content, participants, time, and moment. The presence of a clear and standardized procedure for each of these aspects is important for all participants. Most of the participants expressed their desire for regular consultation moments, which they perceived as opportunities to exchange feedback in both ways. They recognized the importance of these moments in facilitating an open and constructive dialogue, enabling each professional to share insights, perspectives, and concerns.

Nurse 3: "Maybe ask for feedback: 'was everything clear?', 'I prepared the medication yesterday, do you have comments for me?' People rarely ask for feedback themselves; it can work well on both sides, I think."

3.2.4. Expected Competencies of PTAs. Comprehensive awareness of the competencies and authorizations of the PTAs is lacking among nurses. They described that this lack of clarity has contributed to their hesitancy to seek guidance

from PTAs about the medication of their patients. Nurses shared a collective expectation for more clinical reasoning skills among PTAs and seeing them as integral members of the healthcare team. Therefore, participants emphasized the need for clarity on the core competencies and cognitive processes expected from PTAs. This clarity, they believed, should be integrated into supplementary education, assessment, and practical training for PTAs.

Nurse 2: "I don't actually know what kind of training they have had. What do they know? Can we ask them questions about medication or do we really have to call the pharmacy for that?"

Nurse 3: "Basic training, clinical reasoning. A crash course: always look at the context of your patient, if in doubt, consult with the nurse who probably knows the patient better."

3.2.5. Possible Future Roles of PTAs. The lack of comprehensive knowledge on the competencies and authorizations of the PTAs was also reflected when participants were asked about the potential to expand the roles and responsibilities of the PTAs on the hospital ward. Although some nurses were already convinced of the added value that PTAs could bring to tasks such as patient admission and discharge, they uniformly expressed that such an expansion of the role could only be considered viable and effective when there are PTAs assigned to the hospital ward. This continuity, they believed, is crucial in establishing a deeper understanding of the ward's dynamics and developing a level of trust and knowledge necessary for additional responsibilities.

Nurse 4: "I think it would be a whole different story if you have one or two PTAs permanently employed on your hospital ward. When you look at the whole concept of admission, hospitalization and discharge, you look at a competency profile of what a PTA is on our ward."

3.3. Patient Safety and Quality of Care

3.3.1. Nurses' Time Saving and Decreased Workload. Nurses expressed a consistent perspective that the implementation of PTAs not only has resulted in a saving of nurses' time but has also given them the opportunity to redirect their focus to other critical aspects of patient care and contribute to the overall quality of care provided. All participants mentioned a reduced nursing workload on pharmaceutical care. They indicated that this shift in responsibilities enabled them to make more patient rounds, allocate more time for the admission of new patients, and dedicate more attention to individual direct patient care. In addition, it provided the flexibility to engage in meaningful conversations with patients who may benefit from such interactions, addressing their emotional and psychosocial needs.

Nurse 4: “For our night nurses, it’s a return of, I think, two thirds of the medication preparation time.”

Nurse 11: “I think that’s a good thing. Because during the night. . . For example, last week I had two seriously ill people on my ward. I had the opportunity to check on them every two hours, which I couldn’t do before.”

Nurse 16: “It’s just a heavy weight that has been lifted from your shoulders during the night. . . you also have more time for the patients as well.”

3.3.2. Lower Risk of Medication Errors. The participants described the challenges faced by night nurses, who are frequently disturbed by patient calls, medication rounds, and overnight admissions. These factors, in combination with natural daily rhythm, are seen to contribute to a greater risk of reduced alertness during night shift hours. Recognizing potential risks, particularly related to the dispensation of medication and its higher risk of medication errors, participants believed that PTAs decrease the risk of errors because they are dedicated to the singular task of medication dispensing during their time on the hospital ward.

Nurse 3: “They (PTAs) can be specifically working on that, they work on their medication for two hours continuously. The night nurse has never been able to do that, meanwhile there are patient calls, someone doesn’t get well. . . They (PTAs) are doing that, they are not being disturbed by anyone, so you will certainly have fewer mistakes than you are constantly distracted.”

Nurse 4: “I think, according to the time of night, the workload, the whole patient care you are doing, you are not always alert to prepare medication during the night. A PTA is to focus on one task, which is always an added value.”

3.3.3. Creating a Relationship of Trust and Developing Competencies. As mentioned in the previous theme, all participants considered it important to consistently assign the same hospital wards to the same PTAs. This approach has several advantages, offering PTAs an in-depth understanding of prevalent pathologies, improving clinical reasoning skills, and fostering team integration. Some head nurses proposed the idea of permanently stationing one or two PTAs on the hospital ward; in their belief, this could bring additional value to the nursing team by cultivating even stronger relationships, efficient communication, and ensuring a consistently high level of expertise in medication management.

Nurse 13: “It would be more ideal, I think, if we had someone on the ward who was a member of the team and was actually fully in charge of the medication from preparation to administration of the medication.”

Nurse 14: “I really hope they are going to be permanent people who work there, what would make sense. Because you know each other in the long run. You can tune into

each other and you know what to expect from each other. If it’s someone else every time, you don’t know either.”

4. Discussion

In exploring nurses’ views on the implementation of PTAs for medication dispensation on hospital wards, three main themes have emerged: “organization of medication management,” “patient safety and quality of care,” and “role development and collaboration.” PTAs are valuable resources to provide safe, efficient, and high-quality pharmaceutical care.

In the theme “*organization of medication management*,” facilitators and barriers were identified. Clear protocols, comprehensive training, PTA supervision, and efficient task allocation streamlined the process, reducing nurse workload, and improving efficiency. Regarding continuity in assigning PTAs, the disparities in perspectives reflect the dynamic and context-specific nature of healthcare settings. Optimal scheduling and PTA allocation depend on factors, such as patient awareness, ward specialization, and demand for nursing care at different times. On the contrary, the barriers included inadequate PTA numbers and possible medication errors due to a lack of standardized procedures. To enhance this aspect, healthcare organizations should consider investing in resources and establishing standardized procedures. This might involve ensuring an adequate number of PTAs and implementing clear guidelines for their role. By doing so, organizations can optimize the integration of PTAs into nursing practices, thus improving overall medication management [26].

The second theme, “*role development and collaboration*,” emphasized a unified healthcare team. Facilitators, such as clear scopes of practice for PTAs, collaborative work environments, and mutual respect between PTAs and nurses, improve collaboration and task transition [27]. However, barriers such as role ambiguity, inadequate nurse-PTA communication, and resistance to new responsibilities can impede this collaboration.

The third theme, “*patient safety and quality of care*,” highlighted the advantages of implementing PTAs in maintaining high standards of patient safety. Kjeldsen et al. [15] reported that the dispensation of medication by PTAs on a geriatric ward resulted in reducing interruptions, dispensing time, and reported medication errors. Miscommunication between nurses and PTAs could pose a threat to high-quality medication management. Therefore, healthcare teams must prioritize effective communication, double-check procedures, and continuous training to improve patient safety and quality of care [28, 29].

Implementing PTAs on hospital wards presents a multifaceted opportunity for nursing management. While the practical benefits are undeniable, ensuring successful integration requires a comprehensive approach. Beyond facilitating collaboration and fostering communication, nursing managers must navigate ethical considerations and provide adequate training for PTAs. Addressing potential challenges like role ambiguity and proactively managing interprofessional relationships are also crucial [30].

Continuously evaluating the impact of PTAs on patient outcomes and healthcare delivery efficiency allows for optimizing their contribution. By embracing this broader perspective, nursing management can unlock the full potential of PTAs, ultimately enhancing patient care, staff satisfaction, and the overall healthcare delivery system [31, 32].

To prevent missed nursing care, such as patient self-management support, education, psychological support, and shared decision-making, and to promote interprofessional collaboration, team members should have a clear understanding of each role. Creating a cohesive collaboration among nurses, physicians, and pharmacists is crucial to improve the quality of pharmaceutical care and ultimately improve patient outcomes. A precise description of the role of pharmaceutical care is necessary. The NuPHAC-EU framework was developed for this purpose, describing the role of nurses in pharmaceutical care, encompassing patient, and professional networks in seven domains with 26 tasks. Nurses can carry out tasks with varying degrees of autonomy based on contextual factors. This framework provides a structured approach and facilitates discussions among healthcare professionals about shared responsibilities and tasks. Adopting this framework within healthcare organizations can help redefine the roles and responsibilities of nurses and PTAs. It encourages transparent communication among a variety of healthcare professionals and provides essential support during role transitions through comprehensive education and training initiatives [28].

Previous studies on the collaboration between the PTA and nurses suggest a lower risk of medication errors and improved quality of care [12–15]. The perspectives of nurses in this study support the idea that this collaboration is beneficial in healthcare settings. However, to fully optimize PTAs implementation on hospital wards, it is imperative to investigate the experiences and perceptions of these PTAs. Understanding their perspectives, challenges, and insights can provide valuable information to refine the integration process, address potential barriers, and maximize the positive impact of PTAs in medication management within healthcare settings.

This study did not directly measure effects, but the existing literature suggests potential benefits of implementing PTAs, including cost savings, increased nursing time for (in)direct patient care activities, and potentially improving workflow efficiency [12–15, 29, 33]. To understand the PTAs' impact, future research exploring measurable effects, cost implications, and broader outcomes could provide additional information on their effectiveness and contribution to healthcare settings.

Although interviews were conducted across various hospital wards, representing different specialities such as internal medicine, surgery, and geriatrics, focusing on the implementation of PTAs within a single healthcare organization limits the generalizability of the findings to other healthcare settings. However, by exploring the experiences and perspectives of nurses within this specific context, this study offers valuable insights that can contribute to theoretical generalization with caution. These findings may not

be directly applicable to all healthcare settings, particularly those with different cultural contexts, organisational structures, policies, or practices. Nevertheless, the identified themes can provide valuable inspiration and transferable knowledge for other healthcare organizations considering the implementation of PTAs on their hospital wards. This limitation emphasizes the need for further research that encompasses multiple healthcare organizations or settings to provide a more comprehensive and diverse understanding of the implementation and perceptions surrounding PTAs in medication management.

To ensure the robustness of our data analysis and findings, a variety of rigorous methods and techniques were used. Triangulation involved a meticulous cross-validation process. This regular cross-check meetings between the two researchers allowed for critical and sense-making discussion of data interpretations. In addition, discussions within the project group provided a valuable collaborative perspective that served to validate the findings and mitigate potential bias. Furthermore, the thematic presentation and discussion of the themes with the participants were important to maintain the authenticity of our interpretations. This interactive dialogue provided a deeper exploration of the participants' experiences and insights, reducing the risk of superficial or false interpretations, and ensured that the data analysis was embedded in the participants' experiences.

5. Conclusion

This study provided a comprehensive understanding of nurses' perspectives on the implementation and advancement of the role of PTAs in the dispensation of medications on the hospital ward. The recognition of PTAs by nurses as valuable contributors in medication management highlights their potential to positively impact healthcare settings. Understanding and embracing this perspective could facilitate further integration and optimization of PTAs within hospital wards, benefiting both healthcare professionals and, most importantly, the patients they serve.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure

The hospital and the University Foundation from Belgium did not play a role in the design of the study, data collection, analyses, interpretation of the results, or the development and submission of the manuscript.

Conflicts of Interest

MDG, BS, and VR are Vitaz employees (General Hospital—Belgium) and received a part-time salary for this study. The remaining authors have no conflicts of interest to declare.

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Research Article

Inclusive Human Resource Management and Nurses' Innovative Behavior during Crisis Events: The Roles of Job Crafting and Shared Leadership

Yan Wu ¹, Hanqiu Zhu ², Wei Tan ¹, Yifeng Liu ¹, and Wenjuan Huang ³

¹Geriatric Hospital Affiliated to Wuhan University of Science and Technology, Wuhan 430081, China

²School of Management, Wuhan University of Technology, Wuhan 430070, China

³Psychological Depression Ward, Wuhan Mental Health Center, Wuhan 430012, China

Correspondence should be addressed to Hanqiu Zhu; zhuhanqiu@whut.edu.cn

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Aims. Building on conservation of resources theory, our study investigates how inclusive human resource management (IHRM) promotes nurses' innovative behavior through job crafting and further examines the moderating role of shared leadership. **Background.** Nurses' involvement in innovation is essential to improve nursing care delivery and accommodate changing medical environments, especially in the face of crisis events like the COVID-19 outbreak. However, knowledge about the relationship between human resource management and nurses' innovative behavior remains scarce. **Methods.** We collected three-wave data from 338 on-duty registered nurses at four public hospitals in China from November 2022 to January 2023. We used SPSS 22 to conduct hierarchical regressions to test our hypotheses. **Results.** IHRM positively predicted innovative behavior of nurses with the mediating role of job crafting. In addition, we found that IHRM was more effective in promoting job crafting and subsequent innovative behavior when nurses perceived high levels of shared leadership. **Conclusion.** IHRM initiated by the organization and shared leadership style are two collaborative approaches to facilitating nurses' job crafting, thereby responding to the imperative need to foster nurses' innovative behavior. **Implications for Nursing Management.** The present study emphasizes the important roles of IHRM and shared leadership in promoting nurses' job crafting and subsequent innovative behavior, providing theoretical and practical implications for nursing management in the current dynamic and challenging environment.

1. Introduction

In today's competitive and technologically advanced medical environment, the survival and growth of healthcare organizations depend on their ability to innovate [1]. Hospital innovation is driven by the knowledge and innovative engagement of nursing staff, who contribute by introducing new ideas, acquiring new knowledge, generating new ideas, improving current processes, and discovering new technologies [2]. During public health emergencies like the COVID-19 outbreak, nursing staff not only face increased risks of infection and heavier workloads but also need to adapt to new working styles and optimize treatments to achieve healthcare goals [3]. Hence, it holds immense theoretical and practical significance to investigate how to

develop the potential of frontline nurses in elevating the quality of nursing care to overcome major crises that healthcare organizations may encounter [4].

Innovative behavior refers to the intentional generation, promotion, and implementation of new ideas within a work role, group, or organization to enhance role performance [5]. Highly innovative employees can quickly respond to client needs, generate valuable ideas, and optimize processes, which are essential for improving organizational efficiency and effectiveness [6]. In the nursing field, Zhang et al. [7] conceptualized nurses' innovative behavior as generating new ideas, overcoming challenges and obstacles to realize them, and developing new treatment protocols or policies to restore and promote the health of their patients. Workforce aging, the increasing expectations for high-quality care, and

the demand for cost-effectiveness impose greater requirements on healthcare organizations to innovate [8]. In this context, a comprehensive understanding of the drivers behind nurses' innovative behavior is critical for the advancement of healthcare.

Although innovative behavior has provoked extensive attention from scholars in business, education, and project management [2, 9, 10], only a limited number of empirical studies have investigated how to promote nurses' innovative behaviors during crisis events [8]. Furthermore, the majority of these studies has primarily focused on leadership styles, such as servant leadership, humble leadership, and transformational leadership, as antecedents [6, 7, 11], while neglecting the influence of organizational factors, such as human resource management (HRM) practices, on nurses' innovative behavior. However, it is widely acknowledged that innovative behavior is considered discretionary extra-role behavior for most nurses and requires tangible and intangible support from the organization to be sustained (e.g., pay and rewards, an innovative climate, and job autonomy [12]). Numerous studies have shown that HRM practices play a crucial role in enhancing employees' abilities, motivation, and opportunities, thereby influencing their attitudes and behaviors towards innovation [13, 14]. Recognizing the importance of developing relevant theories of HRM practices to encourage innovation in hospitals, Renkema et al. [15] underscored the need for further research in this area. As such, our study contributes to the literature by focusing on the discernible role of inclusive human resource management (IHRM) in promoting innovative behavior among nurses.

During crisis events such as pandemics, frontline nurses face increased psychological and physical demands due to infection control, complex doctor-patient relationships, and occupational hazards during isolation [3, 16]. According to the conservation of resources (CORs) theory, the stressful and threatening environment will pose an intense strain on individuals and consequently lead to potential or actual resource losses, which make individuals typically conserve the limited resources available for innovative behavior [17]. In contrast, a well-resourced organizational context shaped by specific management practices can alleviate individuals' strain and increase their willingness to utilize current resources to engage in innovative activities [18]. As a result, healthcare organizations need to provide nurses with external resources to address stressful demands and reduce the uncertainty of innovation through understanding, respect, and appreciation [19]. IHRM values individuals' differences and unique contributions, treats nurses in a fair and equal way, encourages participative decision-making, and helps nurses adapt to the organization [14]. The support provided by IHRM makes nurses feel that the organization appreciates their competence, invests in their development, and cares about their wellbeing [20], and thus they will proactively conduct innovative behavior in public health emergencies.

The COR theory also suggests that individuals proactively seek to acquire valuable resources through investment to realize the incremental value of the resources [21]. As such, we expect that people are more likely to

engage in proactive behavior when they have sufficient resources available to them [17]. Job crafting, which refers to individuals initiating changes in job demands and resources to align with their abilities and needs [22], has been recognized as a proactive behavior that enhances nurses' engagement in innovation [9, 23, 24]. Job crafting is particularly advantageous to healthcare organizations as these skills can be easily acquired and transferred through training and practical experience in an organizational context [25]. IHRM provides nurses with access to more information and resources, increases their participation and sense of control, and allows them to accumulate knowledge and skills [12, 26]. As a result, nurses are more motivated to craft their jobs, which can significantly impact their innovation [18]. Therefore, job crafting may be a crucial mechanism that transforms the resources provided by IHRM into innovative behavior among nurses.

As previously mentioned, nursing leadership is the key to inducing nurses' innovative behavior and transformative change in hospitals [27]. Informal leadership roles serve as the driving force for nurses to generate novel ideas, set new goals, and implement useful techniques [11], and exploring new insights into nursing leadership helps to tackle varied drivers in the multiple contexts of modern healthcare [28]. Our study complements the research by highlighting the interaction between IHRM adopted by the organization and shared leadership among unit nurses in healthcare delivery. Chen et al. [29] denoted that shared leadership is a dynamic process of interaction among members aiming to achieve unit and/or organizational goals, where members work together to set goals, make decisions, learn and mentor, and support and encourage each other [30], and thus, it can be synergistic with IHRM to generate valuable resources for nurses to craft their job and engage in innovate behavior.

In summary, this study aims to construct a moderated-mediation model (see Figure 1) to examine the internal mechanism and boundary condition of IHRM influencing innovative behavior among nursing staff. Specifically, we seek to answer the following three research questions: (a) whether IHRM can be a critical facilitator of nurses' innovative behavior, (b) whether job crafting can mediate the relationship between IHRM and innovative behavior, and (c) whether shared leadership can amplify the positive effects of IHRM on job crafting and nurses' innovative behavior. We tested our hypotheses through a time-lagged study where questionnaires were administered to registered nurses from four public hospitals in Wuhan between November 2022 and January 2023. The findings from our research can (a) contribute to the literature on the multilateral factors influencing nurses' innovative behavior and the theoretical rationale underlying the relationship between IHRM and nurses' innovation and (b) provide insights for HR practitioners in healthcare to adopt appropriate HRM policies and practices and develop interventions that promote shared leadership and job crafting, thus fostering nurses' innovative behavior.

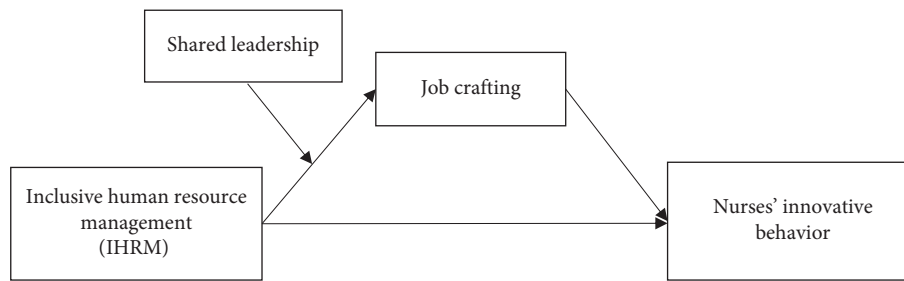


FIGURE 1: Hypothesized moderated mediation model.

2. Theory and Hypotheses

2.1. IHRM and Nurses' Innovative Behavior. IHRM originates from the concept of inclusion and has received widespread attention from scholars over the past two decades. Inclusion, from a leadership perspective, refers to the leader's words and actions that demonstrate an invitation and appreciation for employee contributions [16]. From an involvement perspective, inclusion represents individuals perceiving themselves as part of the organization's key processes [26]. Relationally, inclusion entails building strong relationships with employees and encouraging their participation [31]. From an equity standpoint, inclusion means that employees have the right to express themselves and be appreciated regardless of their social status or class [32]. Taking the optimal distinctiveness perspective, Shore et al. [20] identified inclusion as the extent to which employees feel respected in their work teams based on how well the organization fulfills their need for belongingness and uniqueness. Building on the abovementioned literature, IHRM reflects multiple inclusion-based practices including fair employment policies, participatory decision-making, employee recognition and acceptance, diverse value stimulation and utilization, and rights respect and empowerment [33]. Zhao et al. [14] defined IHRM as a series of interdependent HRM policies, functions, and practices that respect employee differences, recognize employee contributions, accommodate employee mistakes, realize employee strength, encourage employee involvement, and constrain interpersonal conflict to achieve organizational goals. Prior studies identify IHRM as a holistic system consisting of diverse selection (e.g., recruiting heterogeneous employees with multiple knowledge and skills [12]), personalized configuration (e.g., valuing and leveraging employee differential strengths [13]), inclusive development (e.g., providing diversified skills training [34]), participatory assessment (e.g., encouraging participation in the formulation of performance indicators [35]), and targeted compensation (e.g., establishing equal pay system, decent salaries, and good benefits [26]). IHRM ascertains that employees are appreciated and rewarded for their contributions and treated equitably across different position levels [16], and scholars have proven its plausibility in relation to employee creativity [14], wellbeing [12], and job satisfaction [35] within the organization.

Nurses' innovative behavior refers to the process of changing routines or employing new methods and technologies to optimize workflow and enhance patient satisfaction with healthcare delivery [1]. The International Council of Nursing (ICN) recognizes that nursing innovation encompasses the following three phases: idea generation, idea promotion, and idea implementation, and emphasizes its important role in promoting wellness, preventing disease, and improving the quality of healthcare [6]. Innovation is a complex and prolonged process that continuously consumes nurses' psychological, physical, and knowledge resources [4]. During crisis events, healthcare workers experience immense pressure to maintain emotional composure while dedicating themselves to patient care, which often leads to mental dissonance and continued loss of resources [3, 16]. The COR theory postulates that people are motivated to protect their current resources and acquire new resources to defend themselves against future resource loss [18]. As a result, nurses may reduce high-risk innovative behavior if they are aware of potential or actual resource loss [17]. Therefore, it is important to provide nurses with sufficient resources to supplement what has been depleted to promote their innovative behavior [21]. Previous research has confirmed that the workplace represents a proximate environment in which employee resource pools and associated work outcomes are affected by HRM practices [12]. In this vein, IHRM can be viewed as a source of resources for nurses to cope with highly demanding work, which can effectively compensate for nurses' loss of resources and enable them to possess sufficient psychological resources to innovate during crisis events [20].

Specifically, the diverse selection of IHRM emphasizes the need for hospitals to construct multifaceted talent teams, with nurses' gender, age, education, and experience structure displaying a certain degree of complementarity [36]. Nursing staff with various experiences and backgrounds are more likely to form differentiated knowledge structures and critical thinking patterns. These heterogeneous cognitive resources are conducive to the formation of nurses' open-minded visions, which in turn inspire them to develop and implement novel and useful ideas to improve service methods that benefit the patients [33]. Meanwhile, inclusive development focuses on individualized training for nurses to provide them with knowledge and skill resources [35], such as professional knowledge, clinical skills, technology proficiency, emergency response, and communication skills, which are

critically needed to cope with creative requirements. Participatory assessment empowers nurses to engage in the decision-making process and tailor performance appraisal approaches based on specific job characteristics. This practice ensures that nurses feel their viewpoints are respected and have access to organizational information resources, thus significantly enhancing their motivation to conduct innovative behaviors [31]. In addition, IHRM advocates the application of flexible work systems such as shift changes, rotations, and leave transfers in the task allocation process and gives nurses a sense of autonomy through empowerment practices [13]. Job flexibility and autonomy provided by personalized configuration allow nurses to proactively engage in innovative behavior such as creative problem solving to realize resource augmentation [37]. Finally, one's commitment to risky creative activities requires the necessary incentives and support, and favorable compensation and benefits can effectively hedge the risk of loss associated with innovation [26]. Targeted compensation adjusts compensation levels, structures, and strategies in response to feedback from nursing staff to ensure that each nurse's contribution can be valued and rewarded. Sufficient material resources constitute a critical prerequisite for promoting nurses' readiness and willingness to innovate [38]. In summary, IHRM practices serve as valuable resources invested by healthcare organizations to increase nurses' resource stock (e.g., enhancement of professional skills, increase in reward, and reduction of role ambiguity [12]) through diverse selection, inclusive development, personalized configuration, participatory assessment, and favorable compensation. As such, nurses with adequate resources (e.g., support from the hospital, training, and development opportunities) will generate more ideas about public health and nursing service and put them into practice [17]. Thus, we hypothesize the following.

Hypothesis 1. IHRM positively affects nurses' innovative behavior.

2.2. The Mediating Role of Job Crafting. Job crafting is a bottom-up approach to autonomous job redesign that diverges from the top-down approach typically implemented by organizations and places emphasis on employees' initiative to make changes in their work [39]. Following the job demands-resources model, research has identified the following four types of job crafting [22]: increasing structural job resources (diverse resources and autonomy to help employees achieve their goals), increasing social job resources (social support and feedback from managers, colleagues, and others), increasing challenging job demands (accomplish more difficult tasks to improve knowledge and skills), and decreasing hindering job demands (mitigate resource depletion when faced with excessive demands). Nurses who engage in job crafting proactively align their talents, strengths, and interests with their work environment, enabling them to achieve a balance between job demands and resources [23, 25].

We draw on the COR theory to scrutinize how IHRM influences nurses' innovative behavior by fostering their job crafting. The COR theory highlights human's evolutionary need to conserve and acquire resources for survival that is central to the genetics of human behavior [17]. A fundamental principle of the COR theory relates to the notion of resource investment, that is, when people possess sufficient resources, they tend to proactively invest resources in behaviors designed to compensate for prior resource losses or to acquire additional resources [18]. Consistent with this postulation, employees tend to engage in job crafting to invest their resources to create a better work environment when a resource surplus occurs [21]. As earlier mentioned, IHRM implemented by the healthcare institution creates a resourceful organizational context for nursing staff [12]. We, therefore, expect that job crafting can be regarded as an agentic behavior of resource investment that provides individuals with beneficial ways to utilize and transform useful resources derived from IHRM to achieve a positive resource gain spiral [18], such as generating energy, self-efficacy, interpersonal capital, and diverse skills that make employees more resilient to resource loss and more willing to undertake the risks of innovative behavior [40].

We first argue that IHRM can stimulate job crafting among nurses by supplying them with sufficient job resources [39]. IHRM allows nurses to exert considerable influence over organizational decisions and gives them access to more information and resources [14], which largely increases nurses' sense of control and further facilitates their job crafting. Furthermore, training and rotations provided by IHRM enable nurses to accumulate knowledge, skills, and abilities to improve their occupational competence and job performance [34]. Research has demonstrated that individuals with higher occupational competence are more likely to craft their job in a more skillful and professional manner [41]. Nurses who have occupational competence as an available resource can feel more comfortable crafting the way they work. More importantly, Van Wingerden and Poell [42] have emphasized that the opportunity for job crafting is an indispensable factor in influencing individuals' decisions to engage in this behavior. IHRM makes nurses perceive more opportunities to alter their job by providing greater job autonomy. For instance, organizations grant nurses specific job authorizations and autonomy in their work arrangements, allowing them to choose appropriate training, performance evaluation approaches, and benefits tailored to individualized needs. Taken together, we propose that nurses perceiving high IHRM will proactively engage in job crafting based on their talents, interests, and strengths [23]. Thus, we hypothesize the following.

Hypothesis 2. IHRM is positively related to nurses' job crafting.

We further predict that job crafting can positively influence nurses' innovative behavior because job crafting is a proactive behavior that provides nurses with opportunities to access useful resources that promote work goal attainment while reducing obstructive job demands that deplete physical and psychological resources [19]. Specifically,

structural job resources such as increased discretion in work enable nurses to decide how to perform tasks independently and provide them with more chances to try different techniques, methods, and procedures to solve complex medical problems [40], which improves nurses' feeling of obligation to innovate [4]. Social job resources such as head nurses' support can help nurses acquire and accumulate emotional resources that reduce the innovation risk and prevent nurses from falling into the loss spiral due to resource shortage [43]. In line with the COR theory, nurses who possess plentiful material and emotional resources face less pressure at work and are more inclined to exhibit innovative behaviors to enhance self-worth [18, 42]. Meanwhile, increasing challenging job demands can significantly promote job vitality, which to some extent enhances individuals' cognitive flexibility and improves nurses' creative thinking during crisis events [44]. Hindering job demands that impede nurses' growth and development, such as role conflict and bureaucracy, may prevent the optimal functioning of tasks, bring unnecessary stress, and lead to negative emotions in nursing staff [25]. When individuals experience a loss of resources at work, they will adopt a defensive attitude towards behaviors that consume resources [21]. Job crafting avoids resource loss by reducing obstructive job demands, further promoting innovative behaviors among nurses. Taken together, job crafting can promote nurses' innovative behavior by simultaneously facilitating a "resource gain path" that increases job resources and challenging job demands, and inhibiting a "resource loss path" that generates obstructive job demands [19, 22]. Thus, we hypothesize the following.

Hypothesis 3. Job crafting is positively related to nurses' innovative behavior.

Based on the arguments above, we expect that IHRM provides a platform for nursing staff to acquire resources that enhance their abilities, motivation, and opportunities for job crafting, which in turn promotes their innovative behavior. Thus, we hypothesize the following.

Hypothesis 4. Job crafting mediates the positive relationship between IHRM and nurses' innovative behavior.

2.3. Shared Leadership as a Boundary Condition. Shared leadership, as an emerging leadership style, refers to a group dynamic interaction process whereby different members are selected to assume leadership roles at different stages according to changes in the external environment and group members' strengths to achieve the common goals of the group [45]. Leadership style directly affects the nurses' perception and interpretation of HRM practices and further influences their attitudes and behaviors [46]. Shared leadership delivers consistent signals with IHRM that team members are encouraged to participate in decision-making and extensive information sharing [47], making nurses feel a sense of autonomy and initiative to utilize the resources from IHRM for job crafting and innovative behavior [48].

In this sense, we expect that shared leadership may reinforce the positive relationship between IHRM and job crafting. Research has identified leadership style as the contextual force that enables or constrains the eventual implementation of job crafting [27]. Shared leadership dynamically shifts leadership responsibilities among group members based on their expertise and competencies in relation to specific task situations [29]. It allows nurses to break away from the constraints of their previous roles and routines so that they can try out various work methods, fully develop their potential, and improve their efficacy [45]. Thus, nurses under high shared leadership have a higher sense of competence and believe that they can better utilize the opportunities provided by IHRM to craft their job [32]. In addition, since job crafting is the readjustment and optimization of nurses' tasks and relationships related to their work, this process involves the change of the original work pattern and approach, which may be impeded and constrained by their colleagues [49]. Shared leadership breaks down the traditional interpersonal interaction pattern among group members [30], and nurses engage in frequent exchanges and interactions with colleagues to form a sharing, reciprocal, and harmonious relationship [28]. Under high shared leadership, nurses seldom encounter obstacles and constraints from their colleagues and tend to utilize the resources provided by IHRM to conduct job crafting [47]. In contrast, although IHRM enhances nurses' abilities, motivation, and opportunities for job crafting, nurses under low shared leadership lack a sense of competence and are hindered by colleagues, which prevent them from job crafting. Thus, we hypothesize the following.

Hypothesis 5. Shared leadership moderates the relationship between IHRM and job crafting such that this positive relationship is stronger when shared leadership is high (vs. low).

As previously mentioned, shared leadership accentuates the positive impact of IHRM on nurses' job crafting through power and responsibility sharing, team learning, member support, and mutual skill development, and job crafting provides nurses with more resources to engage in innovative behavior [24]. In contrast, nurses who perceive low shared leadership are less likely to utilize the resources derived from IHRM to craft their job and display innovative behavior. Thus, we hypothesize the following

Hypothesis 6. Shared leadership moderates the indirect effects of IHRM on nurses' innovative behavior via job crafting such that this indirect effect is stronger when shared leadership is high (vs. low).

3. Method

3.1. Sample and Procedure. We collected data from on-duty registered nurses at four public hospitals in China. Researchers contacted the chiefs of nursing staff at four public hospitals in Wuhan that are top in healthcare services and medical technology and explained the

purpose and procedures of the study to obtain permission. With the assistance of head nurses, a disclosure statement was delivered to the nurses who participated in the questionnaire survey, including the academic purpose of our research, the principles of voluntariness, anonymity, and confidentiality, which would constitute the informed consent of nurses to participate in the investigation. Nurses participating in the study should meet the following criteria: (a) above 18 years of age; (b) hold a Chinese registered nurse license; and (c) work full time. We excluded nursing staff not directly involved in patient care and who were on leave, such as maternity, sick, and vacation leave. Our research adopted a time-lagged design to collect data at 3 time points with a 1-month interval to minimize the influence of common method variance [50]. Participants responded to the questionnaire items measuring the predictors (IHRM and shared leadership), mediator (job crafting), and outcome variable (innovative behavior) at time points 1, 2, and 3, respectively, and the self-generated anonymous codes were used to guarantee the effective match of the three-wave survey.

Data were collected from November 2022 to January 2023 during the reopening of the epidemic. Table 1 presents the data collection procedures. In light of the population mobility constraints imposed by the epidemic in China, we utilized online methods to collect data and emailed a link with the questionnaire to participants. At Time 1, we sent questionnaires to 400 nurses at four hospitals and asked about their demographics, perceived IHRM, and perceived shared leadership. We received 374 responses. At Time 2, nurses who had completed the Time 1 survey measured job crafting. 352 valid questionnaires were returned. At Time 3, the remaining 352 nurses reported their innovative behavior. We received 345 completed questionnaires. After eliminating 7 invalid questionnaires due to missing and unmatched data, we ultimately obtained a valid sample of 338 nurses, yielding a response rate of 84.5%. Table 2 presents the participants' demographic characteristics. Among the participants, 22.2% were male and 77.8% were female. 18.3% were 25 years old or below, 49.1% were in the 26–35 age range, 29.0% were in the 36–45 age range, and the remaining 3.6% were 46 years old or above. 37.6% reported an associate's degree or below, 53.3% had a bachelor's degree, and the remaining 9.1% had a master's degree or above. 29.9% had 2 years of experience or below, 25.7% had 3–5 years of experience, 27.8% had 6–7 years of experience, and 16.6% had 8 years of experience or above. 47.3% were nurses, 38.5% were senior nurses, and 14.2% were supervisor nurse or above.

3.2. Measures. All measures utilized in this study were drawn from prior research and have been demonstrated to possess satisfactory reliability and validity over time. A 5-point Likert scale was adopted to measure all items, ranging from 1 (strongly disagree) to 5 (strongly agree). The definitions and measures of the variables are presented in Table 3.

3.3. IHRM. IHRM was measured using 20 items adapted from Zhao et al. [14] in the Chinese context. This scale included the following five dimensions: diverse selection (five items, e.g., “in my organization, there is no discrimination against gender, age, ethnicity, religion, nationality, and dialect during recruitment and selection”), personalized configuration (five items, e.g., “My organization considers job demands, nurses' needs, and strengths during task assignment”), inclusive development (five items, e.g., “my organization provides differentiated and individualized training programs to meet the various needs of nurses”), participatory assessment (five items, e.g., “in my organization, performance appraisal emphasizes results feedback, problem diagnosis, and recommendation solicitation”), and targeted compensation (five items, e.g., “compared with similar positions in other hospitals, the compensation offered by my organization is fair and reasonable”). Cronbach's α was 0.930.

3.4. Shared Leadership. Shared leadership was assessed using 16 items from Hoch and Kozlowski [30]. This scale consisted of the following three dimensions: team learning (four items, e.g., “our team actively searches our own performance for deficits”), perceived team support (five items, e.g., “my team really cares about my wellbeing”), and member-member exchange (seven items, e.g., “my team understands my problems and needs”). Cronbach's α was 0.941.

3.5. Job Crafting. We measured job crafting using 21 items from Cheng et al. [25], which had been validated among nurses in public hospitals in China. The scale consisted of the following four dimensions: increasing structural job resources (five items, e.g., “I make sure that I use my capacities to the fullest”), increasing social job resources (five items, e.g., “I ask others for feedback on my job performance”), increasing challenging job demands (five items, e.g., “If there are new developments, I am one of the first to learn about them and try them out”), and decreasing hindering job demands (six items, e.g., “I make sure that my work is mentally less intense”). Cronbach's α was 0.848.

3.6. Innovative Behavior. We measured nurses' innovative behavior using a 6-item scale adapted from Scott and Bruce [5]. A sample item was “in my work, I will actively seek new methods, techniques, and procedures.” Cronbach's α was 0.928.

3.7. Control Variables. Following previous research on innovative behavior [10, 11], control variables of nurses' gender, age, education, and experience were included.

3.8. Analytical Approach. We used SPSS 22 to conduct hierarchical regressions to test our hypotheses. Specifically, we constructed regression models, respectively, with job crafting and nurses' innovative behavior as dependent variables to estimate the standardized regression coefficients

TABLE 1: Data collection procedures.

Research design	Time points	Data collection period	Evaluator	Variables	Questionnaires distributed	Valid questionnaires returned
Time-lagged questionnaire survey	Time 1	1 November 2022–3 November 2022	Nurse self-report	Demographics, IHRM, and shared leadership	400	374
	Time 2	1 December 2022–3 December 2022	Nurse self-report	Job crafting	374	352
	Time 3	1 January 2023–3 January 2023	Nurse self-report	Nurses' innovative behavior	352	338

TABLE 2: Demographic characteristics of the participants.

Variable	N	%
Gender		
Female	263	77.81
Male	75	22.19
Age (years)		
≤25	62	18.34
26–35	166	49.11
36–45	98	29.00
≥46	12	3.55
Education		
Associate's degree or below	127	37.57
Bachelor's degree	180	53.26
Master's degree or above	31	9.17
Experience (years)		
≤2	101	29.88
3–5	87	25.74
6–7	94	27.81
≥8	56	16.57
Position		
Nurses	160	47.34
Senior nurses	130	38.46
Supervisor nurse or above	48	14.20

between main variables. To test the moderating effects, we created an interaction term by mean centering IHRM and shared leadership and performed the simple slope tests following Aiken and West's [51] procedures. Finally, we conducted bootstrap analyses to generate 95% bias-corrected confidence intervals (CIs) for mediation and moderated mediation effects using Hayes' [52] PROCESS macro. The moderated mediation effect was significant if 95% CI of difference between the indirect effects under high (+1 SD) and low (−1 SD) levels of the moderator excluded 0.

4. Results

4.1. Confirmatory Factor Analyses (CFA). We compared measurement models through a series of CFAs using Mplus 8.0. As shown in Table 4, the expected four-factor model yielded a good fit to the data ($\chi^2(98) = 269.189$, CFI = 0.949, TLI = 0.937, RMSEA = 0.072, and SRMR = 0.031) and the hypothesized model fit the data better than the alternative models with fewer factors, indicating that there was an acceptable discriminant validity between the focal variables.

4.2. Common Method Variance (CMV). Following Podsakoff et al.'s [50] recommendations, we first performed Harman's single-factor test to examine the CMV. The results of exploratory factor analysis (EFA) indicated that the first common factor only accounted for 27.1% of the variance, which was less than the threshold of 40% and less than half of the 69.2% of the total variance explained. In addition, results of the CFA showed that the goodness of fit of the five-factor model with an additional latent common method factor was not improved significantly ($\Delta\chi^2/df = 0.127$, $\Delta CFI = 0.011$, $\Delta TLI = 0.013$, $\Delta RMSEA = 0.008$, and $\Delta SRMR = 0.007$) than the expected four-factor model, revealing that the CMV of our study was no serious.

4.3. Descriptive Statistics and Correlations. The mean scores for IHRM, shared leadership, job crafting, and innovative behavior were 3.351 ± 0.718 , 3.613 ± 0.716 , 3.766 ± 0.393 , and 3.753 ± 0.697 , respectively. IHRM was positively correlated with nurses' innovative behavior ($r = 0.261$, $p < 0.001$) and job crafting ($r = 0.254$, $p < 0.001$). Furthermore, job crafting showed a significant positive correlation with nurses' innovative behavior ($r = 0.369$, $p < 0.001$), providing preliminary support for the hypotheses.

4.4. Hypothesis Testing. The results of hierarchical regression analyses are presented in Table 5. After controlling for nurses' gender, age, education, and experience, the coefficient of IHRM on nurses' innovative behavior was significant and positive ($\beta = 0.264$, $p < 0.001$; model 3), supporting Hypothesis 1. In support of Hypotheses 2 and 3, the results revealed that IHRM positively affected job crafting ($\beta = 0.257$, $p < 0.001$; model 1) and job crafting had a positive impact on nurses' innovative behavior ($\beta = 0.350$, $p < 0.001$; model 4). As shown in Table 5, after adding job crafting, the positive coefficient between IHRM and nurses' innovative behavior decreased from ($\beta = 0.264$, $p < 0.001$; model 3) to ($\beta = 0.186$, $p < 0.001$; model 5); however, job crafting was still positively related to nurses' innovative behavior ($\beta = 0.301$, $p < 0.001$; model 5). Thus, we concluded that job crafting partially mediated the impact of IHRM on nurses' innovative behavior. In addition, we used PROCESS macro to examine the statistical significance of the mediation effect. Bootstrap results revealed that the indirect effect of IHRM on nurses' innovative behavior via job crafting was significant (indirect effect = 0.078, 95% CI = [0.039, 0.121]), providing additional support for Hypothesis 4. As shown in Table 5, the interaction between IHRM and shared leadership positively affected job crafting ($\beta = 0.146$, $p < 0.01$; model 2). We further conducted the simple slope tests and plotted the moderating effect in Figure 2. The results showed that the link between IHRM and job crafting was significant and positive under high levels of shared leadership ($\beta = 0.158$, $p < 0.001$) but nonsignificant under low levels of shared leadership ($\beta = 0.044$, $p = 0.303$), supporting Hypothesis 5. Finally, we used the bootstrap approach to calculate the conditional indirect effect to test Hypothesis 6. The indirect effect of IHRM on nurses' innovative behavior through job crafting was significantly positive when shared leadership was high (indirect effect = 0.078, 95% CI = [0.027, 0.145]) but nonsignificant when shared leadership was low (indirect effect = 0.022, 95% CI = [−0.040, 0.079]), and the difference between the indirect effects was significant (difference = 0.057, 95% CI = [0.003, 0.128]), supporting Hypothesis 6. The hypothesized model and standardized regression coefficients are presented in Figure 3.

5. Discussion

Our research answered recent calls to shed light on multiple factors that affect nursing staff's innovative behavior [8, 15]. We conducted a time-lagged field study to investigate whether, how, and when IHRM could promote nurses' innovative behavior by focusing on the mediating role of job

TABLE 3: The definitions and measures of study variables.

Variable	Definition	Dimensions	No. of items	Source
IHRM	IHRM refers to a set of interdependent HRM policies and practices that respect employee differences, recognize employee values, leverage employee expertise, enhance organizational equity, and provide employees with autonomy, flexibility, and the necessary support	Diverse selection, personalized configuration, inclusive development, participatory assessment, and targeted compensation	20	[12, 14]
Shared leadership	Shared leadership depicts an interactive process characterized by collaborative decision-making and shared responsibility whereby group members lead each other to achieve goals	Team learning, perceived team support, and member-member exchange	16	[30]
Job crafting	Job crafting is defined as the changes made by employees to balance their job demands and job resources with personal abilities and needs in response to organizational change	Increasing structural job resources, increasing social job resources, increasing challenging job demands, and decreasing hindering job demands	21	[22, 25]
Nurses' innovative behavior	Innovative behavior refers to the intentional generation, promotion, and implementation of new ideas within a work role, group, or organization. Nurses' innovative behavior may manifest as incremental adjustments to current healthcare processes, services, and products or as innovative pragmatic solutions to restore and enhance patients' health	One dimension	6	[5, 7]

TABLE 4: Comparison of measurement models for study variables.

Models	Descriptions	χ^2	df	χ^2/df	Compare model differences	CFI	TLI	RMSEA	SRMR
Four-factor model	IHRM, SL, JC, IB	269.189	98	2.747		0.949	0.937	0.072	0.031
Three-factor model	IHRM, SL, JC + IB	439.090	101	4.347	$\Delta\chi^2(3) = 169.901, p < 0.001$	0.899	0.880	0.100	0.063
Two-factor model	IHRM, SL + JC + IB	967.325	103	9.392	$\Delta\chi^2(5) = 698.136, p < 0.001$	0.741	0.699	0.158	0.162
One-factor model	IHRM + SL + JC + IB	1868.844	104	17.970	$\Delta\chi^2(6) = 1599.655, p < 0.001$	0.472	0.391	0.224	0.189

Note. $N = 338$. IHRM = inclusive human resource management, SL = shared leadership, JC = job crafting, IB = nurses' innovative behavior. CFI = comparative fit index, TLI = Tucker-Lewis index, RMSEA = root mean square error of approximation, SRMR = standardized root mean square residual.

TABLE 5: Results of regression analyses.

Variables	Job crafting		Nurses' innovative behavior		
	Model 1	Model 2	Model 3	Model 4	Model 5
Control variables					
Gender	0.023	0.034	0.085	0.080	0.078
Age	-0.071	-0.065	-0.030	-0.024	-0.008
Education	-0.034	-0.036	-0.050	-0.039	-0.040
Experience	0.225**	0.210**	0.172*	0.097	0.104
Independent variable					
IHRM	0.257***	0.185**	0.264***		0.186***
Mediator					
Job crafting				0.350***	0.301***
Moderator					
Shared leadership		0.160*			
Interaction					
IHRM \times shared leadership		0.146**			
R^2	0.099	0.127	0.101	0.151	0.183
ΔR^2	0.099***	0.028**	0.101***	0.151***	0.082***
F	7.324***	6.849***	7.486***	11.815***	12.360***

Note. $N = 338$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

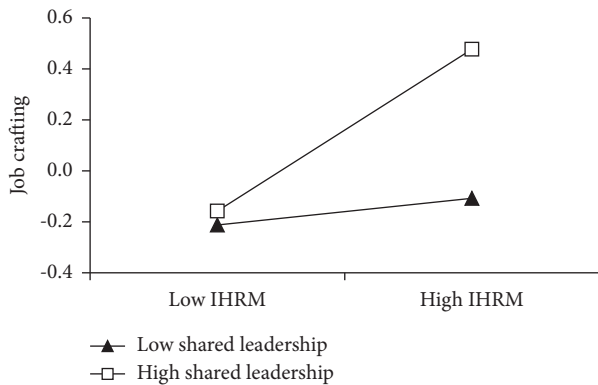


FIGURE 2: The moderating effect of shared leadership on the relationship between IHRM and job crafting.

crafting and the moderating effect of shared leadership. The results demonstrated that nurses perceiving higher levels of IHRM are more likely to engage in job crafting and consequently display more innovative behavior to improve current healthcare processes, services, and products during crisis events and this indirect relationship strengthens when nurses perceive higher shared leadership. Specifically, we obtained the following three findings which contribute to the existing HRM-innovation relationship literature.

5.1. Theoretical Implications

5.1.1. IHRM Is Positively Associated with Nurses' Innovative Behavior.

People's interpretations of inclusion and related practices may vary across cultures. In the Western context, scholars have mainly concerned with the fair and equal treatment of diverse employees, such as providing employees with opportunities to participate in organizational processes and decision-making through practices such as information sharing and employee involvement, thereby reducing discrimination and conflict inside and outside the organization [32, 36, 37]. However, inclusion in the Chinese culture (also known as *bao rong*) has a broader meaning that consists of two critical elements, "seeking commonalities" and "utilizing differences," highlighting the importance of making employees feel respected and integrated into the organization to experience a sense of belonging while preserving and utilizing employee uniqueness to optimize their personal strengths [26]. Therefore, IHRM may be more connected to employee creativity and innovation in the Chinese context [33]. Our results revealed a positive relationship between inclusive management practices and nurses' innovative behavior, which is aligned with the results of similar research conducted in business enterprises [14]. As such, our study extends previous literature by substantiating the applicability of IHRM to nursing staff in the healthcare field.

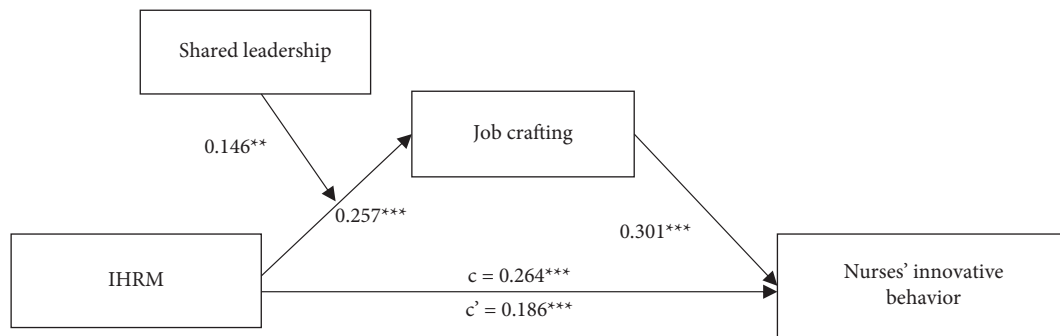


FIGURE 3: Hypothesized model with standardized regression coefficients. Note. $N = 338$. ** $p < 0.01$, *** $p < 0.001$.

However, the investigated hospitals in this study only achieved a medium level of IHRM (3.351 ± 0.718), which is lower than the findings of Zhao et al. [12] who examined knowledge-intensive companies. This suggests that healthcare organizations may lag behind in the development and implementation of HRM practices compared to business firms [8]. Considering the pressure, increasing need for innovation, and limited resources faced by nurses during a crisis, it is crucial for healthcare organizations to be more proactive in implementing IHRM to provide nurses with valuable physical, emotional, knowledge, and skill resources that support innovation [16, 18]. This study provides a theoretical foundation for these organizations to understand and develop relevant HRM policies that promote nurses' innovative behavior.

In addition, although a significant amount of research has focused on appropriate leadership styles as antecedents of nurses' innovative behavior, such as servant leadership, humble leadership, and transformational leadership [6, 7, 11], studies examining how organizational factors such as HRM policies and practices impact nurses' innovative behavior remain scarce. Accordingly, our research empirically confirms the crucial role of IHRM in facilitating innovative behavior, expanding studies on the antecedents of nurses' innovation and responding to the call from Renkema et al. [15] to explore nursing-related HRM theories to encourage innovation beyond leadership.

5.1.2. Job Crafting Mediates the Relationship between IHRM and Nurses' Innovative Behavior. The current study investigated the mediating process that transforms the beneficial impacts of IHRM into nurses' innovative behavior, and notably, the empirical evidence pertinent to this topic has primarily focused on employees' positive psychological states, such as psychological safety and psychological empowerment [8, 10]. Our findings help add to the current knowledge by demonstrating the mediating role of job crafting between IHRM and nurses' innovative behavior. Cheng et al. [25] reported that job crafting is increasingly recognized as an important concept in the nursing field, with its application expanding across different countries and it plays an essential role in improving nurses' person-environment congruence and wellbeing, especially during crisis events. Ghazzawi et al. [23] examined the role of

personality in the Arab World in predicting job crafting and confirmed the positive influence of job crafting on subjective wellbeing of nurses. However, there exists a knowledge gap regarding the relationship between HRM practices, job crafting, and innovative behavior among nurses. The resource investment principle of the COR theory provides a perspective for understanding this issue, which posits that people will proactively invest resources already acquired in the hope of obtaining more resources to improve the environment [18]. In line with Van Wingerden and Poell [42], our findings revealed that IHRM can establish a resource-rich working condition through diverse selection, inclusive training, personalized configuration, participatory assessment, and targeted compensation [14], and this, in turn, motivates nurses to engage in job crafting as a form of resource investment [17]. Our results further suggested that additional increased resources and decreased job demands associated with job crafting enable nurses to devote more time and energy to innovative activities that enhance existing healthcare processes, products, and services [22], thus echoing the research of Khan et al. [24]. In this way, our study unveils the theoretical foundations between IHRM and innovation in the nursing context.

5.1.3. Shared Leadership Moderates the Positive Effects of IHRM on Nurses' Job Crafting and Subsequent Innovative Behavior. As a positive leadership style, our findings shed light on the important role of shared leadership in reinforcing the effectiveness of IHRM on nurses' job crafting and innovative behavior, affirming past research that indicated the synergistic effects of positive leadership styles and HRM practices in response to crisis events [10, 46]. Prior studies have highlighted the advantages of vertical leadership, such as transformational leadership, in fostering innovative behavior among nurses during a pandemic [7], neglecting how horizontal models of shared leadership function. Indeed, despite the tremendous pressure during the crisis, nurses have demonstrated a willingness to craft their job to effectively change how they work and interact with patients to improve the quality of nursing service [4], and this process may be influenced by the initiative and autonomy of nursing staff [8]. As an informal collective leadership pattern characterized by members' proactive involvement, self-management, and mutual leading, shared leadership

emphasizes the sharing of leadership roles among members, such as decision-making, power, and responsibilities [45]. In line with this notion, our results indicated that shared leadership can function as a facilitator that grants nurses greater autonomy and initiative to utilize resources from IHRM to engage in job crafting and innovative behavior [28]. This study not only extends the current understanding of the boundary condition of IHRM but also confirms the reasoning that leadership has the capacity to promote HRM process [48]. Therefore, healthcare organizations should strive to enhance the levels of shared leadership to maximize the benefits of IHRM.

5.2. Implications for Nursing Management. Our research provides several practical implications for HR practitioners and nursing leaders in healthcare organizations. Nurses' innovative behaviors have emerged as a critical issue in recent healthcare research [6] and have been proven to have a positive impact on improvements in the quality and effectiveness of nursing services during a pandemic [7]. To create a supportive environment for innovation among nursing staff, organizations should predominantly concentrate on nurses' vulnerability to stress during a crisis event and provide them with adequate tangible and intangible resources [2, 3]. First, HR practitioners are expected to stimulate nurses' abilities, motivations, and opportunities to innovate by adopting various inclusive practices to increase nurses' stock of resources, reduce their pressure, and leverage their strengths [12]. These HRM policies and practices should include fair employment, flexible work, value appreciation, diverse training, participatory decision-making, decent compensation, and targeted rewards [14]. More importantly, HR practitioners in healthcare should also actively involve nursing staff in these available practices and capitalize on nurses' feedback and opinions to timely adjust HRM practices for their potential innovation benefits [15].

Second, we can understand from this research that job crafting is an essential agentic behavior that has a discernible influence on innovative behavior. Given an array of uncertainties associated with the pandemic, nurses should actively redesign their work to achieve a balance between job demands and resources [19]. Accordingly, nursing managers should create a favorable environment for nurses' job crafting, such as creating autonomous work conditions and avoiding unnecessary interference and monitoring of nurses [25]. By proactively seeking opportunities to craft their job according to talents, interests, and strengths, nurses can acquire valuable resources needed for innovation.

Third, our research revealed that IHRM is more likely to facilitate nurses' job crafting and innovative behavior when nurses perceive higher levels of shared leadership. In the changing medical environment, the complexity of tasks and the urgency of time make it difficult for the traditional vertical leadership style to accomplish work tasks with high-quality [27]. To better adapt to environmental changes, nursing leaders in healthcare organizations should improve the levels of shared leadership. Specifically, team members

should be encouraged to share leadership authority and responsibilities to promote the effective achievement of collective goals [29]. In addition, team members need to learn from each other and try new methods to improve their performance.

5.3. Limitations. Our research has several limitations. First, IHRM, shared leadership, job crafting, and nurses' innovative behavior were all self-reported by the nurses, which would inevitably raise concerns about subjective cognitive bias and social desirability. Although we adopted a time-lagged design to measure the main variables at three-time points during questionnaire distribution to mitigate the CMV and Harman's single-factor test and latent common method factor approach illustrated that this problem was not serious, a single source of data could still have some limitations [50]. Second, this study was conducted in four public hospitals in China. The monocultural and organization-specific context may limit the generalizability and extensibility of our findings. However, the current data do not allow for a direct empirical examination of how contextual factors (e.g., culture, organization, and healthcare systems) might influence the relationships between IHRM and related variables through a comparative design [23]. Third, researchers have demonstrated that time-separated measures can be effective in reducing the potential limitations of cross-sectional data (e.g., CMV and reverse causality [15]). However, the one-month time interval recommended by Podsakoff et al. [50] is insufficient to validate the long-term impact of IHRM on nurses' innovative behavior, which may change as the crisis event continues to progress [16].

5.4. Future Research. We also provide some avenues for future research. First, we investigated the impact of IHRM on nurses' innovative behaviors using individual-level data because prior research indicated that individuals might make differential interpretations of organizational intentions behind HRM practices [12]. However, individuals perceived IHRM could hardly demonstrate the objectivity of HRM practices. Therefore, future research could collect data at both organizational- and individual-level to examine how organization-implemented IHRM can influence nurses' innovation through multilevel analysis. Second, considering the differences between Eastern and Western cultures, individuals may have different understandings of "inclusion" and China's unique culture (e.g., high collectivism) makes people more eager to belong or merge into the group, which may lead to a greater positive impact of IHRM on related outcomes in Chinese culture. Accordingly, we encourage future research to explore the role that cultural factors play in employees' perceptions of IHRM and perform a cross-cultural comparative analysis to generalize our findings. In addition, future research could extend our findings to other healthcare organizations since the innovative requirements and expectations are different for nursing staff under different healthcare systems [7]. Third, it is a feasible direction for future research to expand the present study through longitudinal design to compare the impacts of IHRM on

innovative behavior during a crisis event like a pandemic with the impacts under ordinary situations. In this way, scholars could continue to explore whether IHRM and job crafting can predict changes in nurses' innovative behavior over time. Finally, future studies could examine more extensive mediating variables (e.g., psychological capital, thriving at work, and gratitude) to expand potential theoretical explanations between IHRM and innovative behavior [9]. We also recommend future research to explore other boundary conditions such as proactive personality and servant leadership to extend our findings [2].

6. Conclusion

Promoting nurses' innovative behavior can be an effective way for hospitals to acquire sustainable competitive advantage in today's VUCA (i.e., volatile, uncertain, complex, and ambiguous) medical environments. Based on the COR theory, the current study constructs a moderated-mediation model to explore whether, how, and when IHRM can motivate nurses to be involved in innovative work. We tested our theoretical model through a time-lagged field study and the results showed that IHRM is positively related to job crafting, which in turn promotes nurses' innovative behavior. In addition, we uncover when IHRM has a more pronounced influence on nurses' job crafting and innovative behavior by selecting shared leadership as a boundary condition. We found that the direct linkage between IHRM and job crafting and the indirect effect of IHRM on nurses' innovative behavior through job crafting is significant and positive only when the levels of shared leadership are high rather than low. To conclude, our research indicates that IHRM and shared leadership style are two collaborative approaches to facilitating nurses' job crafting and subsequent innovative behavior during crisis events. As such, hospitals and nursing facilities may improve the level of job crafting by adopting IHRM policies and practices that value the personalized values and demands of nurses and enhancing perceived shared leadership that underscores collective learning, mutual support, and member-member exchange, thereby fostering the innovation of nurses.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no known conflicts of interest. They also declare that they agree with the content of this manuscript.

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Research Article

The Influence of Authentic Leadership Perception on Clinical Nurses' Voice Behaviour and the Mediating Effect of Conscientiousness

YuJun Fan,¹ Xiaoyuan Qu,¹ Wuxing Zhang,¹ Zhimin Tao,¹ and Chaoran Chen ^{1,2}

¹School of Nursing and Health, Henan University, Kaifeng, China

²Institute of Nursing and Health, School of Nursing and Health, Henan University, Kaifeng, China

Correspondence should be addressed to Chaoran Chen; kfccr@126.com

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Aims and Objectives. The objective of this study was to examine the impact of authentic leadership and conscientiousness on the voice behaviour exhibited by nurses. *Background.* Clinical nurses, being integral members of the medical system and actively engaged with patients and their families, possess significant influence in addressing various work-related issues and contribute significantly to the advancement of clinical services and the overall stability of hospitals within the nursing team. Consequently, it is imperative to prioritize the consideration of nurses' recommendations in order to identify the factors that can effectively enhance their enthusiasm in vocalizing their concerns. *Design.* Data in this cross-sectional descriptive study were collected from March 2021 to August 2021 by the online survey method. *Methods.* A total of 679 Chinese nurses were surveyed with a Chinese Big Five Personality Inventory Brief Scale, an Authentic Leadership Scale, and a Voice Behaviour Scale. Because the data were normally distributed in our study, Pearson's correlation coefficient (r) was used to conduct the correlation analysis of the study variables. The structural equation model was used to examine the mediating role of conscientiousness. *Results.* The results showed that the influencing factors of nurses' voice behavior were education background, employment mode, nursing seniority, and monthly income ($p < 0.05$). In addition, authentic leadership, conscientiousness, and voice behaviour were significantly positively correlated (the correlation coefficients are 0.632 and 0.630, respectively, $p < 0.05$). Conscientiousness plays a partial mediating role in authentic leadership. *Conclusion.* Authentic leadership was the key to improving the voice behaviour of nurses; as a mediating mechanism, conscientiousness further explained how authentic leadership promoted the voice behaviour of nurses. The effects of authentic leadership, conscientiousness, and voice behaviour could be used to guide the management of clinical nurses. In particular, the authentic leadership style perceived by nurses and the conscientiousness of nurses would contribute to the generation of voice behaviour.

1. Introduction

In today's complex and rapidly developing medical environment, nurses tend to be the main providers of primary health care services, and the central role of nurses in health care, including their proximity to patients, clinical decision-making roles, health care education, and preventive services [1–3]. Nurses not only have a significant voice in work-related issues but also play a crucial role in advancing clinical services and maintaining hospital stability [4]. In order to promote the development of the organization, the team

hopes that members can actively provide opinions and suggestions, rather than just completing their own work, which needs to mobilize the enthusiasm of subordinates to participate in the day-to-day management of the organization [5–7]. Voice behaviour can be used as one of the ways for members to participate in organizational management, which can not only enhance the protagonist awareness of subordinates but also give full play to their subjective initiative [8].

Recent studies have demonstrated that managers greatly influence employee voice behaviour, as the primary

recipients [9]. Authentic leadership is the concept that managers shape their subordinates' knowledge, attitudes, and behaviours through their genuine qualities and actions in the management process [10]. And the authentic leader focuses on the positive role modelling of honesty, authenticity, and high ethical standards in the development of leader-follower relationships [11]. This type of leadership is characterized by self-awareness, internalized moral perspective, balanced processing of information, and relational transparency, which can affect employees, stimulate employees' authenticity, enhance their trust in their superiors, and thus promote the occurrence of voice behaviour [10].

Therefore, this study proposed the following hypothesis:

Hypotheses 1. Authentic leadership of nurse managers has a direct positive effect on nurses' voice behaviour.

In addition to the influence of some external environment, employees' personal factors, such as personality characteristics, are also a factor affecting their voice behaviour. An academic study by Wechsler has shown that individual personality, as a kind of tendency, can dominate people's behaviour and perception [12]. For example, the introverted personality tends to look for reasons within itself, has a strong introspection, likes to be alone, and avoids more social contact [13]. The personality of the external control type usually believes that the occurrence of things is affected by external factors, and people with this personality prefer to communicate with others [14]. In other words, personality traits, as the expression of the individual's internal character, will have a more important impact on the individual's psychological state and behavioural performance through different attribution methods. This finding is similar to the attribution theory, which holds that individuals have a process of interpretation and judgment of how events or behaviours occur, and these processes will further affect people's subsequent attitudes and behaviours [15–17].

The big five personality model is currently the most widely used personality trait model to make up the personality structure, including neuroticism, conscientiousness, agreeableness, openness, and extraversion [12]. It has been shown to effectively predict individual work behaviour [18]. Relevant literature has shown that different dimensions of big five personality have different predictive effects of employees' voice behaviour. Lepine et al. [6] revealed that the four dimensions of big five personality have a significant relationship with voice behaviour, among which conscientiousness and openness have a positive impact on employees' voice behaviour. In other words, employees with high conscientiousness have stable emotional attachments with the organization, and they tend to show more positive voice behaviours for the organizational interests. Based on the above statements, the following hypothesis is proposed:

Hypotheses 2. Conscientiousness has a direct positive effect on nurses' voice behaviour.

After systematically organizing the research on personality traits and employees' voice behaviour, Yanzhe et al. [19] found that among the big five personality traits,

conscientiousness and extraversion can positively predict employees' voice behaviour. At the same time, some studies also found that the influence of personality traits on voice behaviour mainly acts through motivation, interpersonal relationships, and emotional mechanisms, and also through the personal characteristics and leadership behaviour of leaders [20–22]. Therefore, when nurses are faced with authentic leadership, whether the influence of this type of leadership on their voice behaviour can be changed to a certain extent through the interpretation and influence of different personality traits remains to be explored. Thus, the following hypotheses were developed:

Hypotheses 3. Conscientiousness plays a mediating role between authentic leadership and voice behaviour.

Understanding the ways in which the authenticity of nurse leaders could promote nurses' voice behaviour is important. In this essence, in this study, we developed a conceptual model relating authentic leadership of nurse managers to nurses' voice behaviour. In this model, it is anticipated that conscientiousness would mediate the link between the authentic leadership of nurse managers and nurses' voice behaviour.

To sum up, this study was designed to (1) investigate the relationship between the authentic leadership of nurse managers and nurses' voice behaviours, (2) examine the relationship between conscientiousness of nurse and nurses' voice behaviour, and (3) explore the mediating role of nurses' conscientiousness in the relationship between nurse managers' authentic leadership and nurses' voice behaviour.

2. Methods

2.1. Study Design and Sample. A cross-sectional study was adopted, and the method of convenience sampling was used in this study. Participants in this study were nurses from five general hospitals in north China. Data collection was conducted from March 2021 to August 2021.

A standardized questionnaire will be made and distributed to our subjects (clinical nurses). Before the investigation, researchers were trained in a unified manner. And all of the investigators used a unified guidance language to avoid leading statements. Before the survey, participants were informed of the purpose and significance of the survey and the precautions during the survey. All participants were anonymous and voluntary. The effectiveness of the questionnaire was ensured through an on-site audit and the audit on the same day. Researchers conducted a one-to-one survey of nurses. During the survey, participants were asked to think of a specific leader while filling out questionnaires.

Because this study is descriptive and the primary outcome is a continuous variable, the sample size was estimated using the following formula [23]:

$$n = \left(\frac{U_{\alpha/2}\sigma}{\delta} \right)^2 = \left(\frac{1.96 \times 1.80}{2} \right)^2 = 553.19 \approx 554 \text{ nurses,} \quad (1)$$

where n indicates the required sample size, $U_{\alpha/2}$ is the standardized normal deviation corresponding to $\alpha = 0.05$ and 95% confidence level ($U_{\alpha/2} = 1.96$, for two-tailed), σ

indicates the expected value of standard deviation in the population ($\sigma = 1.80$ from the pilot study), and δ indicates the acceptable margin of error for the mean ($\delta = 0.2$, based on the pilot study). To consider the nonresponse rate and uncompleted questionnaires, 700 nurses were invited to take part in the study.

The inclusion criteria were as follows: (a) licensed staff nurses; (b) nurses on duty during the study period; and (c) nurses had no less than 1 years of tenure in their current hospital. And the exclusion criteria were the rotation of nurses, or those who were unable to participate in the study due to vacation, leave, and illness. Of the 700 questionnaires returned, 21 were invalid and excluded from the analysis. Thus, the final sample size for this study was 679 with an effective rate of 97%.

2.2. Instruments

2.2.1. Sociodemographic Data Questionnaire for Clinical Nurses. After reviewing the literature, we designed the sociodemographic data questionnaire for clinical nurses based on the needs of this study, including their gender, age, marital status, education, hiring method, nursing tenure, and monthly income.

And this study also used three standardized scales to collect the data. And the scales used in this study were professionally translated into Chinese. All items were measured on a 5-point Likert scale.

2.2.2. Authentic Leadership. This study adopts the authentic leadership questionnaire developed by Walumbwa et al. [24], which tests the sample data of Chinese enterprises in the development process of the questionnaire. And this is the most widely used survey scale on authentic leadership at present. The scale includes 4 dimensions, including 4 items of self-awareness, 5 items of relational transparency, 4 items of internalized moral, and 3 items of balanced processing, for a total of 16 items. The Cronbach α value of the scale was 0.95.

2.2.3. Conscientiousness. This study adopts the Chinese Big Five Personality Inventory brief version (CBF-PI-B) compiled by Mengcheng Wang and Xintong et al. on the basis of the China Big Five Personality Questionnaire [25], including five dimensions: neurotic, conscientiousness, agreeableness, openness, and extroversion. There are 8 questions for each personality trait. The Cronbach α value of the scale was 0.93. And this study had selected questions about conscientiousness.

2.2.4. Voice Behaviour. The 10-item Chinese version of the voice behaviour scale was developed by Liang et al. [26]. The tool consisted of two dimensions: promotive voice and prohibitive voice. The Cronbach α value of the scale was 0.93.

2.3. Pilot Study. To ensure the questionnaire was understandable and clear, we did a pilot study. And in the pilot study, we also estimated a preliminary mean of the outcome

variables to estimate the sample size needed. We recruited 30 nurses from the participating hospitals, in the pilot study, who were then excluded from the study sample. The questionnaire took approximately 5–10 min to complete, and piloted nurses assured that the items were understandable and clear.

2.4. Ethical Consideration. First, the informed consent of hospital leaders was obtained before the questionnaire was distributed. The purpose and significance of the study were explained in detail to the participants, and informed consent was obtained. Second, we made sure that participants' responses were used only for the study and that they could opt out at any time. In addition, the study was conducted anonymously, did not include unethical practices or human clinical trials, and did not have any adverse effects on the physical or mental health of the participants. In the end, the Ethics Committee of Henan University approved the study (ID: HUSOM2022-238).

2.5. Statistical Analysis. Data were analyzed using SPSS 24.0 (Chicago, IL, USA) and AMOS 24.0 (IBM Corp.). The demographic characteristics of the participants were described using frequencies and percentages. The three main study variables (i.e., authentic leadership, conscientiousness, and voice behaviour) were described using means and standard deviations. An independent sample *t*-test or one-way analysis of variance (ANOVA) was used to identify differences in the study variable according to demographic characteristics. Pearson's correlation analysis was used to determine the correlation between the major study variables.

A two-step structural equation modeling (SEM) was used to test the hypotheses [27]. According to the recommendation of Hu and Bentler [28], the following goodness-of-fit statistics were used to evaluate the fit degree of model and data: the chi-square/degrees of freedom ratio (χ^2/df), the root-mean-square error of approximation (RMSEA), goodness of fit (GFI), adjusted goodness of fit (AGFI), Tucker–Lewis index (TLI), comparative fit index (CFI), and root-mean-square residuals (RMR). A lower χ^2/df value means better model fitting. Lower RMSEA also suggests better model fitting. GFI, TLI, CFI, AGFI, and NFI range from 0 to 1, with values closer to 1 indicating better fit. Finally, we used 5,000 samples for bootstrap resampling and a 95% confidence interval (CI) to test the direct and indirect effects between conscientiousness, authentic leadership, and voice behavior [29].

3. Results

3.1. The General Characteristics of the Subject. A total of 679 participants participated in the study. The participants were predominantly female (84.7%) and married (72.5%). Of the respondents, more than half had an age less than 40 years (74.3%) and had obtained a Bachelor's degree (69.7%). Regarding working experience, most study participants spent less than 10 years in the nursing profession. Moreover, Table 1 displays the differences in the basic characteristics of

TABLE 1: Participants' basic characteristics and differences in authentic leadership, conscientiousness, and voice behaviour ($n = 679$).

Variables	No. (%)	Authentic leadership		Conscientiousness		Voice behaviour	
		Mean (SD)	<i>t/F</i>	Mean (SD)	<i>t/F</i>	Mean (SD)	<i>t/F</i>
Gender [‡]			-2.015*		-1.365		0.552
Male	111 (16.3)	3.87 ± 0.92		3.82 ± 0.57		3.89 ± 0.82	
Female	568 (84.7)	4.06 ± 0.74		3.89 ± 0.53		3.84 ± 0.76	
Age (years) [†]			3.245*		5.426**		4.164*
<30	200 (29.5)	4.06 ± 0.76		3.78 ± 0.54		3.73 ± 0.72	
30–39	304 (44.8)	4.08 ± 0.79		3.94 ± 0.53		3.93 ± 0.79	
≥40	175 (25.7)	3.90 ± 0.74		3.90 ± 0.53		3.86 ± 0.76	
Marital status [†]			0.476		0.655		0.198
Single	174 (25.6)	4.06 ± 0.79		3.85 ± 0.52		3.82 ± 0.75	
Married	492 (72.5)	4.02 ± 0.77		3.89 ± 0.55		3.86 ± 0.76	
Others ^a	13 (1.9)	4.18 ± 0.81		3.98 ± 0.47		3.80 ± 1.03	
Education [†]			4.880**		1.628		3.030*
≤Associate's degree	165 (24.3)	4.13 ± 0.78		3.94 ± 0.55		3.95 ± 0.75	
Bachelor's degree	473 (69.7)	4.02 ± 0.76		3.86 ± 0.53		3.83 ± 0.77	
≥Master's degree	41 (6.0)	3.71 ± 0.82		3.84 ± 0.58		3.65 ± 0.74	
Hiring method [†]			1.866		4.559*		5.481**
Officially budgeted posts	216 (31.8)	3.96 ± 0.81		3.97 ± 0.56		3.98 ± 0.73	
Human resource agent	79 (11.6)	3.97 ± 0.78		3.88 ± 0.50		3.70 ± 0.77	
Independent contractor	384 (56.6)	4.08 ± 0.75		3.83 ± 0.53		3.81 ± 0.78	
Nursing tenure (years) [†]			2.895*		3.348*		5.019**
≤5	214 (31.5)	4.11 ± 0.74		3.83 ± 0.54		3.83 ± 0.76	
6–10	171 (25.2)	4.00 ± 0.79		3.86 ± 0.54		3.87 ± 0.70	
11–15	160 (23.6)	3.91 ± 0.78		3.85 ± 0.52		3.72 ± 0.81	
≥15	134 (19.7)	4.12 ± 0.76		4.01 ± 0.53		4.05 ± 0.76	
Monthly income (¥) [†]			4.310**		1.619		2.907*
≤3000	38 (5.6)	3.85 ± 0.77		3.91 ± 0.53		3.65 ± 0.77	
3001–6000	270 (39.8)	3.96 ± 0.84		3.92 ± 0.53		3.82 ± 0.77	
6001–10000	304 (44.7)	4.13 ± 0.69		3.86 ± 0.55		3.92 ± 0.77	
≥10000	67 (9.9)	4.19 ± 0.71				3.98 ± 0.61	

^aOthers: divorced and widowed. [‡]*t*-test for the independent group. [†]One-way analysis of variance. * $P < 0.05$; ** $P < 0.01$.

the participants in authentic leadership, Conscientiousness, and Voice behaviour. Nurse's perception of authentic leadership was significantly different in different gender, age, education, nursing tenure and monthly income. In terms of conscientiousness, there were significant differences in age, hiring method, and nursing tenure. Similarly, different education, hiring method, nursing tenure, and monthly income also significantly affected the score of voice behaviour (Table 1).

3.2. The Correlation of Variables. Pearson's correlation coefficient showed that there was a moderately positive correlation between authentic leadership and conscientiousness ($r = 0.513$, $P < 0.01$) and voice behaviour ($r = 0.632$, $P < 0.01$). Similarly, this relationship also existed between conscientiousness and voice behaviour ($r = 0.630$, $P < 0.01$; Table 2).

3.3. Path Analysis of Each Variable. In order to explore the relationship between conscientiousness, authentic leadership, and voice behaviour of clinical nurses, voice behaviour was taken as the dependent variable, authentic leadership as the independent variable, and conscientiousness as the mediating variable. Based on the previous studies, a corresponding structural equation model was constructed, and

TABLE 2: Correlation between authentic leadership, conscientiousness and voice behaviour.

Variables	1 <i>r</i> (<i>P</i>)	2	3
(1) Authentic leadership	1		
(2) Conscientiousness	0.513**	1	
(3) Voice behaviour	0.632**	0.630**	1

** $P < 0.01$.

the Bootstrap method was used for validation analysis. The model-fitting index was used to determine the fitness degree between the results and the data. The results showed that the model fitted well with the data (Table 3).

We conducted a path analysis to estimate the direct and indirect effects of both authentic leadership and conscientiousness on voice behaviour (Figure 1). The results revealed that authentic leadership has positive and significant direct effects on voice behaviour ($\beta = 0.396$, $P < 0.001$) and conscientiousness ($\beta = 0.565$, $P < 0.001$). Similarly, conscientiousness has a positive effect on voice behaviour ($\beta = 0.521$, $P < 0.001$). When conscientiousness was added as the mediating variable, the effect size of authentic leadership on voice behaviour increased by 0.294, and the total effect size reached 0.691. Therefore, conscientiousness has a partial mediating effect between authentic leadership and voice behaviour (Table 4).

TABLE 3: Model-fitting standard and fitting index of the final model.

	χ^2/df	RMSEA	GFI	AGFI	TLI	CFI	RMR
Model-fitting standard	<3.0	<0.08	>0.9	>0.9	>0.9	>0.9	<0.08
Model-fitting index	2.994	0.054	0.887	0.859	0.941	0.945	0.035

χ^2/df , the chi-square/degrees of freedom ratio; RMSEA, root-mean-square error of approximation; GFI, goodness of fit; AGFI, adjusted goodness of fit; TLI, Tucker-Lewis; CFI, comparative fit index; RMR, root-mean-square residuals.

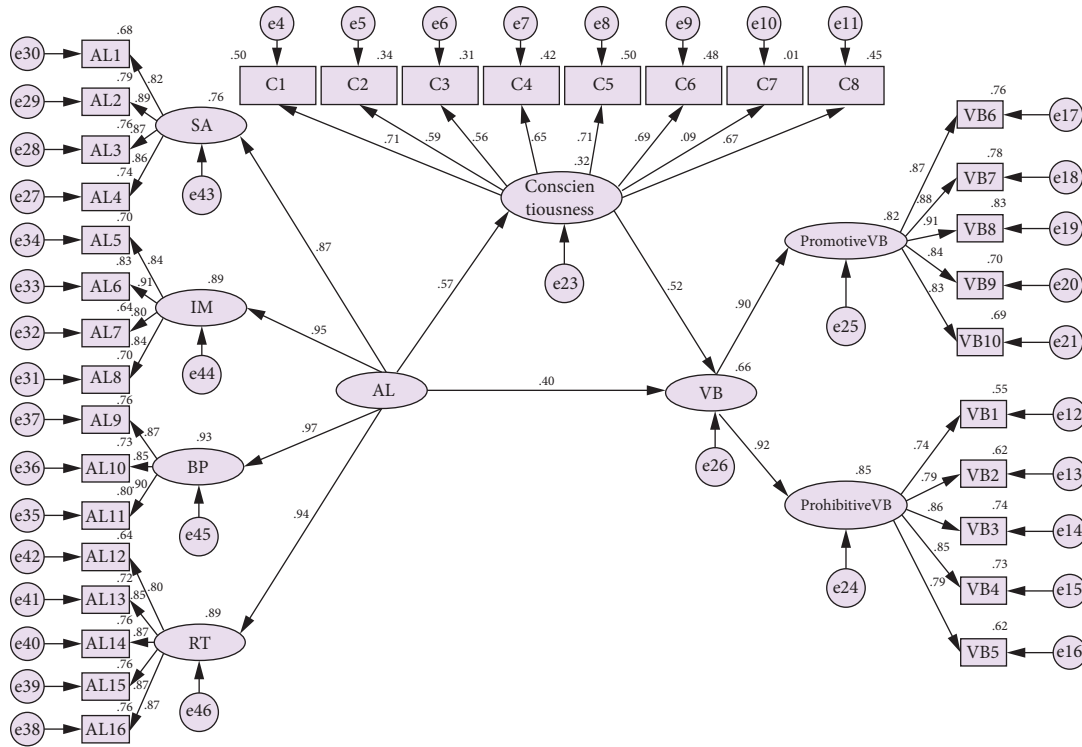


FIGURE 1: The structural model of this study. AL, authentic leadership; AL1-16, The 16 items of authentic leadership; SA, self-awareness; RT, relational transparency; IM, internalized moral; BP, balanced processing; C1-8, The 8 items of conscientiousness; VB, voice behaviour; Promotive VB, promotive voice behaviour; prohibitive VB, prohibitive voice behaviour; VB1-10, the 16 items of voice behaviour.

TABLE 4: Standardized direct, indirect and total effects of the hypothesized model.

	β	SE	Percentile 95% CI		Bias-corrected percentile 95% CI		P
			Lower	Upper	Lower	Upper	
<i>Standardized direct effects</i>							
AL → Conscientiousness	0.565	0.036	0.490	0.631	0.489	0.630	<0.001
AL → VB	0.396	0.046	0.304	0.483	0.304	0.482	<0.001
Conscientiousness → VB	0.521	0.044	0.435	0.606	0.434	0.606	<0.001
<i>Standardized indirect effects</i>							
AL → VB	0.294	0.030	0.239	0.356	0.240	0.358	<0.001
<i>Standardized total effects</i>							
AL → Conscientiousness	0.565	0.036	0.490	0.631	0.489	0.630	<0.001
AL → VB	0.691	0.034	0.620	0.754	0.618	0.753	<0.001
Conscientiousness → VB	0.521	0.044	0.435	0.606	0.434	0.606	<0.001

Note. Standardized estimating of 5,000 bootstrap samples. AL, authentic leadership; VB, voice behavior.

4. Discussion

This study was designed to determine the effect of authentic leadership on nurses' voice behaviour at work. And the structural equation model was used to confirm whether

nurses' conscientiousness played a mediating role in the effect of authentic leadership on voice behaviour. The general characteristics show that 84.7% of the nurses that participated in this study were female, which is in line with previous studies performed in China [9].

In this study, a nurse's age, education, hiring method, length of clinical work experience, and monthly income are positively related to their voice behaviour. A previous study [30] found that the length of clinical working time and monthly income are important factors affecting nurses' voice behaviour, which was consistent with our research results. Our study found that clinical nurses who have worked for more than 15 years and earned more than 10,000 yuan per month scored higher in voice behaviour. This is consistent with the investigation of Zhao et al. [30]. Nurses who have worked for a short period of time are worried about their lack of professional knowledge and clinical experience, lack of mutual trust with leaders and colleagues, and fear of putting forward inappropriate opinions or suggestions, so nurses who have worked for a long time are more familiar with the work of the department and more willing to talk [31, 32]. In terms of education level, nurses with an associate's degree or below had more active voice behaviour. It may be because most of the highly educated nurses are new graduates. This was consistent with Wesche's research results which identified how newcomers will often choose silence to fit in (organizational socialization) rather than suggest changes which could risk relationships [33].

In addition, in this study, authentic leadership was positively correlated with nurses' voice behaviour, and authentic leadership had a positive and direct predictive effect on nurses' voice behaviour ($\beta = 0.396$, $P < 0.001$). Voice aims at challenging the position of organizations, so it is risky [34]. Leaders usually regard the voices as threats, so they react negatively to outspoken employees [35]. Considering the risk of speaking, employees would carefully assess their social background before speaking [36]. If employees' voices are regarded as complaints or annoyances by leaders, they may face negative comments and be assigned to dissatisfying jobs [37]. At this time, employees would give up the voice to avoid adverse consequences and regard the voice as dangerous behaviour [38]. Authentic leaders know their own strengths and weaknesses and will be aware of their own limitations in making decisions and solving problems, so they are more likely to accept employees' ideas and opinions and even encourage employees to challenge the tradition. Furthermore, the authentic leader is committed to the establishment of a transparent relationship within the organization, which requires managers to balance the diversity and discrepancy of information. These acts will enhance subordinate trust in leadership, let them give up concerns, and allow them to express their true thoughts and feelings [39]. This shows that under the authentic leadership of the head nurse, the nurses and the head nurse trust each other and get closer to each other. When there is any problem in the work, the nurses will put the interests of the collective in the first place.

The results of this study showed that nurses' conscientiousness was a positive predictor of voice behaviour ($\beta = 0.521$, $P < 0.001$), indicating that the higher the conscientiousness of nurses, the more positive their voice behaviour that is consistent with previous research [6]. Voice behaviour is the behaviour that employees take the initiative to make suggestions to leaders or point out the existing

mistakes of the organization in order to improve the organizational effectiveness [40]. However, people with conscientiousness are generally more careful and prudent [41]. At the same time, people with high conscientiousness scores tend to be more goal-oriented [42]. In order to improve the organizational environment, they think they have a responsibility to contribute to the organization and are willing to have an active dialogue with colleagues and leaders [43]. They express their views patiently until they were understood [44].

The structural equation model analysis of this study showed that the direct predictive effect of head nurses' authentic leadership on nurses' voice behaviour was 0.396 ($P < 0.001$), the total effect of head nurses' authentic leadership on nurses' voice behaviour was 0.691 ($P < 0.001$) after adding conscientiousness personality, and conscientiousness had a partial mediating effect in the effect of head nurses' authentic leadership on nurses' voice behaviour. In other words, when nurses perceive the authentic leadership, their personality will affect their voice behaviour by their self-perception. This finding is in line with attribution theory, which holds that an individual's personality influences subsequent behaviour by judging and interpreting the behaviour of others or the external environment [15, 16]. Voice behaviour is aimed at promoting mutual cooperation, expressing employees' views and opinions on the organization. When the head nurse adopts an authentic leadership, nurses can feel the trust, care, and motivation from their superiors, so that they are more willing to integrate the development goals of the organization into their personal values and ideals [45]. Nurses with conscientious personality are cautious and responsible. Based on these characteristics, nurses with conscientiousness will not avoid talking about the problems found in their clinical work. Moreover, nurses with conscientiousness will be more likely to perceive and amplify the authenticity of the leaders [46], so as to promote the relationship between authentic leadership and voice behaviour.

5. Limitation

First of all, convenience sampling method was adopted in this study, and only a few hospitals in Henan Province were selected, with regional limitations, the generality and popularization of the conclusions may be limited. Second, the data obtained in this study were based on self-report. Although all participants had obtained anonymity and confidentiality, they still could not completely avoid reaction bias and social desirability bias could have affected the reporting of this behaviour. Finally, this was a cross-sectional survey, so the observed association should not be considered causal, and further research is required to explore the causal relationship.

6. Conclusion

This study explored the influence of authentic leadership and conscientiousness on the voice behaviour of nurses through the SEM. The results showed that authentic leadership and

conscientiousness had a direct impact on voice behaviour. Conscientiousness partially mediated the relationship between authentic leadership and voice behaviour. Therefore, the nursing managers in the medical institutions, especially the head nurses, should actively develop an authentic leadership style. At the same time, training the conscientiousness of nurses can effectively promote voice behaviour. Since this study is a cross-sectional study, a longitudinal design is needed in the future to verify the validity of the findings.

7. Implication for Nurses' Management

Our findings provide many practical implications for hospital management. First of all, in view of the role of authentic leadership in promoting voice behaviour, the managers in medical institutions, especially the managers of nurses such as the head nurses, should actively change their leadership behaviour patterns and cultivate authentic leadership styles. Managers should share information, be open and honest in their dealings with employees, seek feedback from employees, involve them in decision-making, and demonstrate their ethical standards. Secondly, this study found that conscientiousness can play a partial mediating role between authentic leadership and voice behaviour, which suggests that managers should pay full attention to the fact that employees have individual differences. In their daily work, managers should identify employees' personality characteristics and formulate differentiated coping strategies in management. And managers also should pay attention to the selection and appointment of conscientious nurses. In order to arouse the enthusiasm of nurses, nurse managers can enhance their sense of responsibility by means of material, promotion, and modeling.

Abbreviations

ANOVA:	Analysis of variance
SEM:	Structural equation modeling
AL:	Authentic leadership
ALI-16:	The 16 items of authentic leadership
SA:	Self-awareness
RT:	Relational transparency
IM:	Internalized moral
BP:	Balanced processing
C1-8:	The 8 items of conscientiousness
VB:	Voice behaviour
Promotive VB:	Promotive voice behaviour
Prohibitive VB:	Prohibitive voice behaviour
VB1-10:	The 16 items of voice behaviour.

Data Availability

The [sav] data used to support the findings of this study are available from the corresponding author upon request.

Additional Points

Patient or Public Contribution. Participants contributed to this study by completing a questionnaire that included

sociodemographic data, authentic leadership, conscientiousness, and voice behaviour.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Authors' Contributions

Yujun Fan wrote the original draft, coordinated the project, and analyzed the data. Chaoran Chen supervised, reviewed, and edited the study. Xiaoyuan Qu and Wuxing Zhang proposed the methodology and were responsible for consultancy. Zhimin Tao reviewed and edited this study.

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Research Article

The Influence of Connection on Early Career Nurses' Rural Experiences: A Descriptive Phenomenological Study

Rebecca Barry , Latitia Kernaghan , Elyce Green , and Claire Ellen Seaman 

Locked Bag 588, Three Rivers Department of Rural Health, Charles Sturt University, Tooma Way, Wagga Wagga, NSW 2678, Australia

Correspondence should be addressed to Rebecca Barry; rbarry@csu.edu.au

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Introduction. Rural nursing careers offer a multitude of benefits for individuals. Despite this, there continues to be a growing deficit in the number of nurses choosing to practice in rural areas. As the first 12–18 months of a nursing career are fundamental in shaping career location decisions, it is important to explore factors that influence early career nurses' employment decisions. *Methods.* A phenomenological study was undertaken to explore early career nurses' experiences during their first year of rural practice and describe how the nurses' experiences influenced their decision to remain in rural employment. Data were collected via semistructured interviews and underwent inductive thematic analysis. *Results.* Seven early career nurses practicing in rural locations were interviewed and described several influences on their career location decisions, particularly related to whether they would stay in or leave their rural employer. The themes derived from the nurses' stories included the effect of their vulnerability entering a new workplace, the importance of connection to person, place, and profession and the nuances of rural nursing rhythms. These had implications on their employment decisions. *Conclusion.* This research demonstrates the distinct form of nursing practice that occurs in rural areas which was experienced by the early career nurses as a breadth of skills, volume of presentations, and continuity of care. The nurses described the importance of establishing connections to person, place, and their profession. These connections can support nurses through a period of vulnerability entering a new workplace.

1. Introduction

Rural nursing careers can provide a multitude of benefits for individuals, including higher wages, providing a sense of belonging, and allowing nurses to work to their full scope and develop generalist nursing skills [1]. Despite these benefits, there remains a significant shortage of nurses working in rural areas, which is expected to continue to grow [2, 3] despite an increasing number of graduates [4]. The rural nurse shortage has led to significant efforts to conceptualise and explore ways to retain staff in these locations. The first two years of a nurse's career are important in this endeavour, as the first 12–18 months of employment has been reported as the period in which a decision is made to stay or leave. To date, research that has explored the experiences of early career nurses has largely been conducted in metropolitan settings [5–9]. Rural nurses have a distinct

scope of practice which includes functioning as an advanced generalist, being intricately linked with community, and holding significant responsibilities in delivering health services [10, 11]. It is therefore important to conduct research that considers practice from the unique perspective of rural nurses. There has been research conducted on recruitment and retention specifically in rural areas, but this has not included early career nurses as a sample group [2].

This qualitative study focuses on the experiences of early career nurses practicing in rural areas in New South Wales (NSW), Australia, and describes the influences on their retention. Early career nurses in this context refer to nurses registered with the Australian Nursing and Midwifery Board, which requires them to have completed a three-year undergraduate degree consisting of theoretical and practice-based education. Many early career nurses employed in the NSW public health system are enrolled into a program that

focuses on the first year of transition to practice. Programs similar to this have been evaluated previously and found to be highly variable in terms of content and success [12]. There is also evidence that the effect of factors such as ward culture and experiencing a sense of social inclusion influence the retention of junior nurses, although this remains largely underexplored in research [13–15]. The purpose of undertaking this research was therefore to contribute to an increased understanding of the influences on early career nurses' employment decisions in rural areas.

To do this, a descriptive phenomenological design was used to privilege the experiences of the early career nurses, understanding they are unique and highly impactful on their employment decisions. Descriptive phenomenology (versus interpretive phenomenology) was chosen to guide this research as it requires the researcher to use bracketing and develop an outlook of the phenomena from which they are distanced [16]. The researchers felt that this reflected the nature of the inquiry related to a phenomenon from which they are distanced (in relation to geography, discipline, and career stage) and seeking to explore broadly. This approach is appropriate for addressing the study aims as it recognises that career decision-making is complex and requires an open exploration of the reasons nurses leave their employment, as well as those that influence them to stay [17].

1.1. Aims

- (1) To explore early career nurses' experiences during their first year of rural practice.
- (2) To describe how the nurses' experiences influenced their decision to remain in rural employment.

2. Methods

This paper presents results from a qualitative analysis of interviews undertaken as part of a larger, mixed methods research project. Descriptive phenomenology was used as the aims were focused on exploring the subjective experience of early career nurses. Using this methodological approach, the researchers sought to explore how the first year of practice (the phenomenon of interest) was viewed by the individual. Ontologically and epistemologically, this research adopted a lifeworld approach based on the work of Husserl [18]. This view negotiates between subjectivism and objectivism and focuses on the relationship between participants and the world. "The lifeworld is the lived and experienced world and thus it is something more than the world itself, and more than the subject itself" [19]. The researchers involved in collecting and analysing data were guided by the methodological principles of descriptive phenomenology suggested by Sundler et al. [20], emphasising openness, questioning preunderstanding, and adopting a reflective attitude. Bracketing was conducted within the stage of openness, whereby the researchers identified and set aside their assumptions and pre-suppositions in order to be open to the data [16]. This research is reported in line with the consolidated criteria for reporting qualitative research (COREQ) [21] to enhance

transparency and trustworthiness of the research process and results [22]. For the purpose of this study and the discussion in this paper, rural refers to locations rated 1–4 (Inner Regional to Very Remote) using the Australian Statistical Geography Standard (ASGS) Remoteness Structure [23].

2.1. Participants and Data Collection. Participants were purposively recruited from orientation sessions for cohorts of early career nurses (first year of practice) commencing in either of two rural local health districts in New South Wales, Australia, in 2019 and 2020. Recruitment was conducted 10–12 months from when the nurses commenced working in their role to capture them at a stage where they had experience of the phenomenon (working as an early career nurse) and were still located in their rural site (the early career program is for 12 months, and many nurses relocate after this period). The total size of the cohort was 175 nurses who were entering the workforce having become a registered nurse within the previous 6 months. Prospective participants were able to identify interest in being interviewed by noting their contact details at the end of a survey that was administered during orientation sessions as part of the larger research project. Coercion bias was mitigated by using a research team who were not known to the nurses and employed by a separate organisation. Outcomes of the research were not tied to the nurses' employment. Nurses who left their contact details were contacted by a researcher (EG or RB) to discuss the project and then emailed the information and consent sheets. After one week, the researcher invited the participant to an interview, arranged at a time of convenience for the participant.

Interviews were conducted by two members of the research team (EG and RB) and were completed virtually using an online videoconferencing platform. Interviews took between 27 and 46 minutes (with a mean time of 36 minutes). A semistructured interview guide was used to conduct the interviews (Table 1). The interview guide was developed based on the information required to answer the research question and concepts from the literature thought to affect the experiences of early career nurses (i.e., social connections, career ambitions, and placement locations). One question was added to the interview guide following the second interview as the participant raised the impact of COVID-19 as being significant for their experience as a nurse, so this was asked of subsequent participants. Data saturation was not used as guidance for participant numbers, taking the view of Braun and Clarke [24] that meaning is generated through the analysis rather than reaching a point of saturation. The sample size was therefore guided by how many nurses opted in to the research and a sample of seven is sufficient considering the phenomenological approach [25, 26]. For all interviews, only the researcher and the participant were present and each interview was video-recorded and then transcribed verbatim. Written informed consent was obtained from each participant prior to the interview, and no participants withdrew after providing consent. Each interviewee was offered to be sent a copy of the interview

transcript to review and make any comments, explanations, or amendments; however, none opted to do so.

2.2. Data Analysis. Thematic analysis of interview transcripts was undertaken using a descriptive phenomenological approach. Guidance from the work of Sundler et al. [20] was used, whereby the process of analysis incorporates visiting the interview transcripts as a whole and as individual descriptions of the phenomena, with the researchers moving between closeness and distance from the data. Data analysis was conducted by three members of the research team (RB, LK, and EG). The three researchers who undertook data analysis identify as women and are from the disciplinary backgrounds of social work, occupational therapy, and nursing, respectively. The three researchers all work at a regional university and are involved in programs that focus on the recruitment and retention of rural health professionals. As health professionals, they have all practised in rural Australia for >10 years.

During analysis, each researcher considered their pre-understanding of the phenomena and conducted open-minded reading (bracketing) before exploring the meanings embedded in each interview. The process of data analysis was highly reflective, and the team met frequently throughout the process of analysis to discuss and reflect on results. Thematic analysis was inductive, and the themes presented in the results of the research were data-driven. To reflect the importance of the individual story for understanding the results of the research, each participant was given a pseudonym name and their story presented as part of the results. This acknowledges the different journeys and experiences of each person. Quotations used in the results section aim to give voice to each participant and are attributed to the person from whom the words came.

2.3. Ethical Approval. This research was granted human research ethics approval by the Greater Western Human Research Ethics Committee, approval number 2019/ETH00108.

3. Results

3.1. Summary of Participants. Seven early career nurses, all of whom identified as women and had been working as a registered nurse for 10–12 months, opted to be interviewed for this research. A summary of the participants and their stories is presented in Table 2.

3.2. Thematic Analysis. A descriptive phenomenological approach was undertaken to analyse the data, and themes were inductively developed using the experiences of the participants. There were three main themes identified in the data that related to the individual experiences of the participants and told a story about the overall influences on the nurses as they entered professional practice and subsequently made decisions about employment. The themes included “The effect of vulnerability during

a period of transition,” “Connection to person, place, and profession,” and “Nuances of rural nursing rhythms” and are presented below with reference to the experiences of the individuals.

3.3. The Effect of Vulnerability during a Period of Transition.

The theme “Effect of vulnerability during a period of transition” demonstrates the experiences of the early career nurses joining a new workplace and, in many cases, a new profession. During this transition time, many of the nurses spoke of their feelings of vulnerability, and how this resulted in their experiences having a heightened effect on them. Riley’s experience demonstrated this

“... it was a big shock to my system. My previous job was 9 to 3 Monday to Friday and now I’m full-time on a rotating roster. So trying to balance social life and adulthood with work especially having to drive . . .” (Riley)

Similarly, Jesse felt that the transition had a significant effect on her familial and social connections.

“I think for the first couple of months I didn’t see anyone or talk to anyone. I was just too tired, and too overwhelmed. And there was so much new knowledge coming at me all the time that I—it was just—it was a good effort if I could do the dishes on that day, or make my bed. There was—it was hard. Now it’s a little bit better.” (Jesse)

The vulnerability felt by the nurses resulted in their initial experiences being strongly influential on their happiness and decisions to remain or leave. Sam described receiving a warning when she first arrived in the new town and how this affected her entire experience.

“So, when I started, I remember the first day, my NUM (nurse unit manager) came to pick me up . . . and the first thing she said to me that really surprised me was, she said we’ve got a lot of strong characters here and I was like okay and I didn’t know what it means” (Sam)

For Sam, this conversation put her on alert for conflict and affected the way she approached the role. In contrast, some participants spoke to the value of a supportive, welcoming, and positive atmosphere within the team where skill development, feedback, and teamwork were modelled by existing team members. Examples of this included being supernumerary for two weeks, monthly debriefing session, and creating and extending their social connection to the community, as was demonstrated by Alex.

“In the country hospitals, the senior nurses are really lovely, and they’ll always back you up, and then if you’re not unsure what’s happening with a patient, they’ll lead you and they’ll tell you where you need to look, and what information you can investigate or research or do more studying. So, you’ll feel like a real nurse then. . .” (Alex)

TABLE 1: Semistructured interview guide.

Question	Additional questions to probe for more information
1 Tell me about why you chose to become a nurse? What kind of nurse do you see yourself as?	(i) Probing for life experience or influences on career choice (ii) Looking for an understanding of if/how they identify themselves as rural or working within a rural context
2 Tell me about how you decided to come and do the transition to professional practice in this local health district?	(i) Probe for other experiences of living/working in rural areas before study, during study etc. (ii) Feelings of connection to the area
3 During your undergraduate studies for nursing, did you do any clinical placements in a rural/regional/remote area?	(i) Tell me about your experience/s
4 Did these experiences affect your decision to take a position in this local health district?	(i) What influenced your decision-making?
5 What were the best and most challenging parts of being a new graduate?	(i) What do you think are the best parts about being a new graduate? (ii) Let's talk about the most challenging parts of being a new graduate. . .
6 Tell me about your experience of COVID-19 and the effect it has had on you (if any) personally and professionally?	(i) Looking at the effects of the pandemic on both social and professional experiences (ii) Has your perspective of your future career as a nurse changed due to COVID?
7 Tell me about the social, nonwork side of things over the past year while you have been doing the program?	(i) Social and community connections, keeping in touch with family and friends, feeling a sense of belonging
8 What are the things that would/have made you want to stay?	
9 What do you think the future holds for you career-wise?	(i) Looking to see what opportunities they perceive are available, factors that affect decision to stay or leave and where they will be seeking future employment (ii) What's next for you?

TABLE 2: Summary of participants and their stories.

Summary of participants' experiences
<p><i>Sam's story:</i></p> <p>(i) Applied for new graduate program in rural area as heard positive stories from other student nurses about rural nursing, no family living in the area</p> <p>(ii) Experienced "negative" work culture and limited clinical support. Did not experience a sense of belonging, inclusion, and connection at work and in the community</p> <p>Outcome: relocated from the area where the new graduate program was completed and secured employment in an outer regional area</p>
<p><i>Alex's story:</i></p> <p>(i) Applied for new graduate program in rural area for experience and employment prospects, no family living in the rural area</p> <p>(ii) Felt supported by senior nurses and team. Included and connected to people outside of work</p> <p>Outcome: relocated back to major city area after completing the new graduate year to be with family</p>
<p><i>Darcy's story:</i></p> <p>(i) Applied for new graduate program in rural area as previously worked as an enrolled nurse there. Strong connection to the rural area and rural people. Family living in the area</p> <p>(ii) Some feelings of being overwhelmed by the clinical work as a new graduate. Felt welcomed into the team and well supported</p> <p>Outcome: despite an interest in relocating to work in a larger hospital, decided to stay in the rural area and consider relocating after 5 to 10 years</p>
<p><i>Charlie's story:</i></p> <p>(i) Applied for new graduate program in rural area as already residing there. Strong connection to the rural area and rural people. Family living in the area</p> <p>(ii) Some challenges related to the COVID impact on work, including reduced access to study days and professional development. Felt welcomed into the team and well supported</p> <p>Outcome: stayed in the rural area after new graduate year as felt familiar with the service and seeking job security</p>
<p><i>Kelly's story:</i></p> <p>(i) Applied for new graduate program as worked as an enrolled nurse there and felt supported by management. Strong connection to the area and rural people. Family living in the area</p> <p>(ii) Some challenges related to the COVID impact on work, such as access to professional development. Felt supported at the service, attracted to the familiarity and flexibility of the service</p> <p>Outcome: stayed working in the rural area after new graduate year for career and professional development opportunities, support from colleagues and the flexibility with family commitments</p>
<p><i>Riley's story:</i></p> <p>(i) Applied for new graduate year in Sydney and Melbourne as intended to move to city. Accepted new graduate offer in a rural area after being unsuccessful with first preference</p> <p>(ii) Some challenges related to balancing shift work and social life. Felt welcome and supported, developed connections with colleagues and community. Enjoyed learning exposure, opportunity to be in charge</p> <p>Outcome: stayed in the rural area after the new graduate year for financial, social, and lifestyle reasons</p>
<p><i>Jesse's story:</i></p> <p>(i) Applied for new graduate year in rural area as already residing there and hesitant to leave, family close by, strong connection to rural areas and people</p> <p>(ii) Some challenges related to the COVID impact on work, adjusting to full time work and making connections with people due to age. Felt a sense of belonging and experienced a positive culture at work</p> <p>Outcome: planned to stay in the rural area after new graduate year for support, connection with colleagues and community</p>

The impact of a transition period of vulnerability for many of the nurses meant that their initial introduction into the rural workplace had lasting and significant effects. The initial positive or negative experiences influenced their career choices. One exemplification of this was described by Sam who had applied for a rural nursing position and was excited to commence a rural career. The negative work culture and limited support experienced by Sam led her to relocate to a different rural facility at the end of her one-year contract.

The research participants did describe some protective factors that assisted them during their period of vulnerability and negated some of the effects of their experiences. These were described as having previously undertaken shift work, having lived locally, or having skills that were transferable to

this new environment. An example of this was shared by Kelly.

"I know like a lot of people say like time management's really difficult in your first year out, but, for me, because I had already been an enrolled nurse and I think, you know, I'm a mum of, you know, 4 kids and so I feel like, for me, my time management skills are pretty spot on because I've had to be able to study and be able to work."
(Kelly)

In summary, this theme demonstrates the increased vulnerability of early career nurses in relation to personal and professional challenges, the influence this has in terms of heightening the effect of positive and negative experiences,

and some of the skills and experiences that can potentially mitigate some of these effects.

3.4. Connection to Person, Place, and Profession. The early career nurses who participated in this research felt their experiences had been moulded through the connections they made to people, place, and the profession. This was largely spoken of in the context of working in a rural workplace. Feelings of belonging in their new environment were important to the nurses. This was shown by Kelly who described,

“... we know a lot about each other, we share a lot of information about ourselves and our family because we work really long hours [together]... these people that we work with become your extended family, and that’s definitely a rural [hospital].” (Kelly)

Many of the participants described the positive effect of colleagues being open and happy to share knowledge, creating regular social catch ups either inside or during work hours (i.e., regular lunch outside of the hospital). Other examples were colleagues attending the same Church, organised group nights out, text messaging after work to check in, sharing of food in the staff room, and invitations to colleagues’ homes.

Feelings of belonging were not discussed in the isolated environment of the workplace. Two of the nurses who were established in the rural location prior to their new career felt a sense of belonging that extended into the community. Kelly explained,

“... Most of the other nurses and colleagues I work with know a lot about my family and they will see my children down the street or at the shops and most of them, you know, my children, you know, share a special bond with them as well and – yeah. So that’s probably a really good thing about working rurally...” (Kelly)

Darcy also discussed connection and belonging in relation to the wider rural community,

“...I usually can relate to most people because I’m married to a farmer as well. So a lot of the patients have got farming—are either farmers themselves, or married to farmers, or connections to—like you sort of feel connected more than just one person—on a personal level. You sort of feel like you’re connected I guess locationally as well...” (Darcy)

As a profession, nursing also connected the participants to the community. Darcy described how the nursing uniform connects people “because nearly everyone knows someone that works at the hospital.” Kelly had similar sentiments about the nursing connection to community and spoke about knowing patients as people,

“I like to work in rural areas because I’m in a community where you see these people that we discharge and we see them down the—you know, at the supermarket or we see

them somewhere out and they recognise us and we recognise them and in some ways you follow up with their story... the whole story and their journey that they go through with their health...” (Kelly)

Although feeling connected to the rural community influenced the nurses’ decisions to stay working in this location, feeling disconnected had the opposite outcome. Sam described feeling disconnected which led her to relocate to a different rural town. Reflecting on her experience, Sam explained

“I think it was not culturally, it’s not, it wasn’t, I wasn’t, I didn’t feel like I was part of it. Like after work I had no life and you know, I tried going out exercising and all that kind of stuff, but you know, when the nurses, they don’t involve you in activities...” (Sam)

For Sam, the segregation had significant effects and she got to the point where

“I don’t think I can survive here... you would finish work after a stressful shift and all you need is a friend and you’ve got no one there. There is no one...” (Sam)

This theme demonstrates the nurses’ experiences of connection and how this influenced their career decisions. These findings show that nurse retention is influenced by factors not solely related to their learning and clinical practice but is connected with their personal embeddedness in a community. Riley explained

“... You just feel so loved and supported which is going to be hard to say goodbye to if I do decide to go onto somewhere else.” (Riley)

3.5. Nuances of Rural Nursing Rhythms. The participants described their experiences of rural nursing and discussed this type of work as being a distinct form of practice. They highlighted that, in rural areas, patients are often significant people in their community and/or personal life. Participants described the rhythm of rural practice as being unique as they often followed someone through their entire admission, working across specialties from emergency to aged care. Kelly explained

“I really enjoy seeing someone’s life—I suppose—like the whole story and their journey that they go through with their health and being able to try to help them in those ways.” (Kelly)

The practice scope of rural nursing and this continuity across a person’s health journey was also described as facilitating greater rapport and understanding of a person’s individual health and circumstances. Sam even described one experience of closeness with a patient

“Being there for a patient like that when there is no family member, you know, holding his hand, just telling them it’s okay I’m here with you. As a graduate nurse, that was the

beauty I had there was, you know, you do everything. . .” (Sam)

Rural nursing rhythms were also described in relation to the volume of emergency presentations which, in some sites, were infrequent but challenging due to the variety and unpredictability. This required a unique skill set particularly when working without other health professionals onsite in a geographically isolated area. This perspective contributed to the narrative of rural nursing as a distinct form of practice requiring a broad set of skills.

In addition to the professional considerations of a rural nursing career, Jesse described the challenges it could pose when negotiating shift work and personal commitments,

“... I don't feel I have enough time off to go and see my family. It's a weekend trip if I go, it's 3 hours, or 5 hours depending on which I go. And so I think yeah having 2 days off after you finish on an afternoon is—it's too hard to make an effort to go to—to go either—either place. So I haven't seen them in a long time.” (Jesse)

These professional considerations therefore also interact with connections and, in this instance, affected the nurse's access to support networks. Although this was a complication for Jesse, for Alex who had also newly moved to the area, the rural rhythm was one of contentment.

“... you have your own peace and quiet, and then if you want that social life, you can have social life, you can go to see other people, or you can organise something” (Alex)

This theme demonstrates the early career nurses' description of rural nursing rhythms as being a distinct form of practice, allowing for continuity of care, and being considered in the context of geography. The nurses reflected positively on their clinical experiences, and there were no instances of the nurses reporting an intention to leave based on clinical experiences.

4. Discussion

Early career nurses have been recognised as a cohort of nurses who can be highly mobile due to a range of personal and professional factors [27]. This research sought to explore the experiences of early career nurses in rural areas to determine the influences on the likelihood they would be retained in their rural workplace. It was identified that during the period of transition into the workplace, these nurses were vulnerable to the effects of their environment, such as their work culture and connectedness to the rural community. This heightened vulnerability may, in part, be explained by a phenomenon known as culture shock [28] or transition shock [29], caused by a misalignment between expectations and reality of entering the nursing workforce.

The vulnerability of early career nurses during the transition into the workplace can put them at risk of negative outcomes associated with poor workplace culture. Clarke et al. [30] previously estimated that 60% of nurses will leave

their first job due to the behaviours of their colleagues. Our research demonstrated that for Sam, the segregation from colleagues was the primary reason for leaving her employment. Sam spoke about experiences of feeling like an outsider and the way that this influenced her life within and outside of work. In contrast, other nurses had experienced feelings of being “part of an extended family.” These experiences of the early career nurses as insiders versus outsiders reflect similar findings of research conducted by Ho et al. [31]. They described how early career nurses experienced “support and belonging” or “feeling unsupported and alienated” [31]. Explored through the lens of job embeddedness, Ho et al. [31] found that early career nurses who felt like outsiders were less likely to be retained in the workplace. Considered in relation to a rural context, it is potentially even more important to connect early career nurses to their workplace and colleagues, especially those new to the area or without strong existing connections who are more likely to be socially and geographically isolated.

In the context of early career nurse experiences and retention, engaging in socialisation tactics may be valuable for rural health organisations as they attempt to support newcomer nurses transitioning into the rural health workforce [32]. These tactics include various mechanisms focused on transforming “an outsider to an effective insider” [32] and supporting an employee to adapt to the new environment, behaviours, and knowledge. Suggested mechanisms to achieve this in nursing include structured rotations, staff support, ongoing education, and mentorship programs [6, 33, 34]. Research by Saks et al. [35] has demonstrated the relationship between socialisation tactics and newcomer adjustment, finding tactics that represent institutionalised socialisation were negatively related to factors such as intentions to quit and positively related to factors such as job satisfaction, performance, and organisational commitment. In the rural environment, further consideration should also be given to interplay between collective and individual socialisation due to the size of the population. Results from this study suggest that connections with colleagues may be of greater significance in rural areas due to the limited interpersonal interactions that occur outside of work, particularly for a newcomer to the community. Outside of socialisation tactics, our research also showed that some of the early career nurses felt that prior experiences such as having previously done shift work, having lived locally, or having skills that were transferable to this new environment acted as protective factors during their transition phase. These factors could be further explored in future research.

The implications of feelings of connectedness in rural nursing practice have previously been discussed by Conger and Plager [36]. They found that connectedness was essential for the retention of rural nurses and “graduates who reported a sense of disconnectedness when working in a rural community were less likely to remain in that community” [36]. An additional consideration discussed by Conger and Plager [36] was the experience of connectedness for rural nurses entering a new community. For nurses entering rural communities as outsiders, there is added complexity in establishing connections as they are starting with minimal

ties. The imperative to establish connections is significant due to its influence on both recruitment and retention of rural nurses [36]. This reflects the experience of several of the early career nurses discussed in our research as the rural origin nurses described maintaining connections as a protective factor, and those moving in from outside the communities described the connection as a primary influence on retention.

In research focused on understanding flourishing among rural nurses, Crawford [37] also identifies connection as important and that “rural nurse participants felt a deep connection to their communities and their role within the community as a nurse.” In this context, Crawford [37] used Edgar and Pattinson’s [38] definition of flourishing, which they relate to wellbeing, but point out that it additionally captures vulnerability and suffering to “create a framework through which one can meaningfully and constructively go on with one’s life” (p. 161). Crawford found that “working with a purpose” helped rural nurses flourish [37]. In our research, the early career nurses discussed being able to work with people who were important to them and/or a part of their community, as well as being able to provide a continuity of care and see the outcomes of their work. This was very similar to the activities attributed by Crawford as contributing to a sense of purpose and flourishing in rural nursing, including working across diverse role and skills, and the meaning behind each encounter with a patient [37].

Connection therefore plays an important role in shaping the experiences of rural nurses. Although the results of our research demonstrated that this role was largely positive, other research studies focused on rural nurses has demonstrated that connection to communities can create difficulties for some nurses when personal and professional boundaries become blurred [39, 40]. The experience of early career nurses in navigating professional and personal boundaries is worthy of future exploration.

Rural nursing has been acknowledged as a distinctly unique form of practice for more than 20 years [28, 41, 42]. It is therefore unsurprising that the early career nurses in this study identified it as such. Interestingly, the early career nurses did not reflect on their clinical practice as a significantly influential factor in their career decisions. They instead pointed to factors such as their connections with people, place, and profession as being primarily related to their employment location. This is different to the findings of similar research conducted by Rose et al. [33] who also used a phenomenological approach to explore the experiences of early career nurses in rural areas. Rose et al. [33] found several factors that influenced nurses’ experiences, including professional factors such as scope of practice, need for ongoing education, specialty rotations, and lack of staff and resources. They did, however, also find several personal factors that influenced the early career nurse experience, including the sense of community, importance of collegial support, and maintaining a work/life balance [33]. These differences in findings may be attributed to a difference in years of experience of the nurses recruited for Rose et al. [33] research as compared to our research. As several (10 out of

13) nurses interviewed by Rose et al. [33] had been practicing for >1 year, it is possible the time they had to adjust to their career and location may have changed the emphasis they placed on different factors that influenced their career decisions. The nurses in our research had all been practicing for ≤1 year and therefore had less time to establish personal and professional connections, thus placing these at the fore in their experiences.

This study has highlighted that connectedness and inclusion in both the workplace and the community for nurses during the period of transition cannot be underestimated and can impact on retention in rural areas. These findings have implications for employers and communities supporting nurses and emphasises the importance of prioritising, planning, and implementing practical strategies to promote inclusion, connectedness, and a positive workplace culture. Strategic and specific ways in which to assist early career nurses to experience a sense of belonging and embeddedness in the workplace and transition to the unique experience of rural nursing present an opportunity for future research.

There are a number of limitations inherent to the design of this study. Participants were recruited via their workplace and thus although steps were taken to ensure they understood the research would not affect their employment, it is possible some nurses perceived an association between the research and their employment. Asking participants to self-select participation in the project may also have resulted in nurses who had either very positive or very negative experiences opting to participate, as they may be more likely to want to discuss their experiences. Finally, as this research was exploratory, it is not generalisable to the broader population but instead provides a platform for further research on this topic.

5. Conclusion

This study demonstrates the vulnerability felt by early career nurses as they transition into a new profession and how this can result in a heightened response to experiences during the initial 12 months of practice. The nurses in this study described the distinctness of rural nursing as a profession, and the benefits associated with this type of practice, such as using a variety of skills and providing care, cross a continuum. Primarily, the nurses’ career decisions were influenced by their experience of connection to person, place, and profession. These results can be used to further conceptualise the importance of connection and belonging in achieving retention of staff in rural areas.

Data Availability

Due to the ethical obligations of the authors, the data used in this study are not available.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

The COREQ checklist is included as additional supplementary information to detail the location of pertinent data within the manuscript. (*Supplementary Materials*)

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Research Article

Influence of Perceived Job Demands on Professional Quality of Life and Turnover Intentions of Haematology Nurses: A Cross-Sectional Study

Sheng Lian Tan ¹, Huaqiong Zhou ², Huimin J. Thian ¹ and Phillip R. Della ²

¹Nursing Division, Singapore General Hospital, Singapore, Singapore

²Curtin School of Nursing, Curtin University, Perth, Western Australia, Australia

Correspondence should be addressed to Phillip R. Della; p.della@curtin.edu.au

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Background. Haematology nurses in Singapore experience a highly stressful work environment and increased workload due to the growing number of patients and complex treatment regimens. High job demands can lead to burnout and high staff turnover rates, which compromises the quality of patient care. **Aims.** To assess perceived work demands, levels of social support from colleagues, professional quality of life (ProQOL), and turnover intentions among haematology nurses and examine whether demographic and occupational characteristics, perceived job demands, and support were associated with ProQOL and turnover intentions. **Design.** A descriptive, correlational, and cross-sectional design was used in this study. **Methods.** A convenience sample of 60 haematology nurses working at a tertiary hospital in Singapore completed a self-administered survey. Perceived job demands, support from colleagues, ProQOL, and turnover intentions were measured using the Copenhagen Psychosocial Questionnaire (COPSOQ III), Professional Quality of Life Scale version 5 (ProQOL5), and Turnover Intention Scale (TIS-6). Descriptive statistics, chi-square test, and multiple linear regressions were employed for data analysis. **Results.** Haematology nurses face high cognitive and emotional demands and receive high levels of support from colleagues at work. The majority of the participants reported moderate to high levels of compassion satisfaction (78.3%), burnout (76.7%), and secondary traumatic stress (81.7%). 53.3% of the participants expressed their intention to leave. Perceived job demands were significant predictors of haematology nurses' ProQOL and turnover intentions. Compassion fatigue also significantly predicts turnover intentions. **Conclusion.** The high levels of burnout and secondary traumatic stress reported by haematology nurses highlight an urgent need to implement strategies to help nurses cope with the high work demands and reduce their levels of compassion fatigue. **Implications for Nursing Management.** The findings in this study can help nursing leaders understand haematology nurses' perceived job demands and ProQOL, to develop strategies to improve the workplace environment and retention.

1. Introduction

The global nursing workforce shortage is a growing issue that has been exacerbated by the COVID-19 pandemic [1]. Nursing workforce shortages are especially significant in the oncology and haematology disciplines [2]. Besides monitoring patients closely for adverse treatment side effects and toxicities, oncology and haematology nurses are also being subjected to highly emotive situations on a regular basis and are at high risk of occupational exposure from chemotherapy administration [2]. The hazardous and highly

stressful work environments of cancer care present challenges for organisations to recruit and retain oncology and haematology nurses [2, 3]. In Singapore, the growing numbers of haematology patients coupled with new and complex treatment regimens, such as the chimeric antigen receptor (CAR) T-cell therapy, have increased workload and demands for nurses in the haematology discipline. Retention of experienced haematology nurses is essential to support these demands and maintain quality patient care and optimal patient outcomes [2]. Therefore, gaining an improved understanding of factors that influence work-related

outcomes such as professional quality of life and turnover intentions is crucial to retaining nurses in this discipline.

Haematology nurses have frequently been classified as a subset of oncology nursing in published research studies [4, 5]. However, providing clinical care for patients with haematological disorders comes with unique circumstances and challenges. Haematological malignancies have unpredictable disease trajectories, and treatment regimens are often more complex and intensive than those administered for solid tumours [4]. Therefore, haematology patients spend significantly more time in the hospital, especially those who undergo haematopoietic stem cell transplants [5]. The prolonged interaction allows haematology nurses to develop sustained and therapeutic relationships with the patients, which increases nurses' vulnerability to emotional distress and burnout when the patients experience poor outcomes or are potentially at the end of life [4]. Burnout and stress can lead to high staff turnover rates, further aggravating the haematology nursing workforce shortage [2].

Workload or workplace demands have been identified as a primary factor associated with job dissatisfaction, burnout, coping, and intention to leave the discipline among haematology and oncology nurses [6–9]. Studies had revealed that nurses felt guilt or frustration when workload or workplace demands prevented them from spending sufficient time talking to patients or developing a connection with them [10–13]. Nurses deem having ample time with patients to be crucial in the provision of high-quality care and being unable to do so could likely be a precipitating factor for compassion fatigue [10–13]. Workload was found to be the sole independent significant predictor of exhaustion and the single factor that differentiates nurses who were experiencing high levels of exhaustion from those experiencing low to average levels of exhaustion among 230 Australian cancer nurses [7].

Teamwork and support from colleagues were identified as a key resource that helped oncology and haematology nurses cope with challenges at work [10, 12, 14]. Nurses who experienced secondary traumatic stress expressed that social support from their colleagues helped them cope with difficult situations at work and that their colleagues understood them the best [12]. Likewise, early career nurses reported that their coworkers were the only ones who could relate to the workplace frustrations that they experienced, and support from coworkers helped them to buffer stress during work [10]. In addition, teamwork and support from colleagues were found to reduce compassion fatigue and burnout in oncology and haematology nurses [3, 13, 15]. Oncology nurses in the United States and Canada were revealed to be less likely to experience compassion fatigue and burnout and derive more compassion satisfaction when they perceived team cohesiveness at work [15].

Professional quality of life (ProQOL) refers to the quality of life perceived by people who work in a helping profession and comprises compassion satisfaction and compassion fatigue [16]. Compassion satisfaction refers to the positive feelings derived from work, whereas compassion fatigue encompasses burnout and secondary trauma from nursing patients suffering or experiencing traumatic stress [16].

Studies that examined demographic variables such as age, gender, marital status, education, and work-related variables such as years of experience associated with ProQOL reported inconsistent findings [15, 17–19]. Besides that, studies conducted in different countries have also reported varying scores and levels of compassion satisfaction, burnout, and secondary traumatic stress among oncology and haematology nurses.

The mean scores of compassion satisfaction ranged from 31.81 to 42.6 [15, 17–20]. For burnout, the mean scores reported ranged from 21.14 to 28.38 [15, 17–20]. The mean compassion fatigue scores reported by oncology nurses in Portugal and China were 25.82 and 21.39, respectively [17, 19]. Besides ProQOL scores, the levels of compassion satisfaction, burnout, and secondary traumatic stress or compassion fatigue among oncology and haematology nurses based on cutoff scores proposed in the ProQOL manual were reported in some studies. In Korea, approximately 75% to 80% of the participants reported average to high levels of burnout and secondary traumatic stress [18]. Duarte and Pinto-Gouveia [17] described similar findings among participants working in different public hospitals in Portugal. In comparison, 82% to 89% of the nurses in Spain expressed average to high levels of burnout and secondary traumatic stress [21]. Despite more participants reporting higher levels of burnout and secondary traumatic stress, a higher percentage (34.3%) of nurses in Spain reported high compassion satisfaction levels compared to the nurses in Korea (28.1%) [18, 21].

Turnover intentions were found to be associated with ProQOL, work demands, and demographic or occupational characteristics of haematology and oncology nurses. Low compassion satisfaction, high burnout, and high secondary traumatic stress were revealed to be significantly associated with participants' intentions to transfer to another unit [21]. Compassion satisfaction and burnout were also reported to be significant predictors of turnover intention among oncology nurses in the United States [20]. In contrast, Wells-English et al. [20] did not find that secondary traumatic stress significantly predicts turnover intentions. Similarly, turnover intentions were only found to be associated with compassion satisfaction and burnout, not secondary traumatic stress [18]. Besides that, Jang et al. [18] also showed that 51.6% of the 285 Korean oncology nurses surveyed had a turnover intention. Interviews conducted by Saifan et al. [22] revealed that some Jordanian nurses working with cancer patients faced difficulties balancing between work demands and their personal lives, which led to intentions to leave their jobs. In contrast, Giarelli et al. [11] found that 18 out of 20 nurses working in a haematology-oncology unit expressed intention to continue working in oncology nursing within the next five years. However, it is of note that none of the 20 participants reported low levels of compassion satisfaction or high levels of burnout and secondary traumatic stress [11]. 59.8% of the nurses surveyed in Turkey wanted to change their wards and clinical speciality, with workload being cited as one of the main reasons for that intent [8]. Meanwhile, Park and Ahn [23] investigated the correlations between demographic and occupational

characteristics and turnover intentions of Korean nurses and found age, job ranking, work experience, type of employment, and place of work were significantly associated with turnover intentions.

Findings from the literature review suggested that workplace demands and support from colleagues were potentially associated with oncology and haematology nurses' ProQOL, burnout, stress, and intention to leave. The Job Demands-Resources (JD-R) model postulates that every occupation involves job demands and resources, which are risk factors linked to job-related stress [24]. Examples of job demands include high patient load or emotionally taxing interactions with patients and family [24]. On the other hand, job resources can be found at the organisational, interpersonal, or task levels and include job security, autonomy, and supervisor or coworker support [24]. The JD-R model proposes that job demands and resources set in motion two separate psychological processes in developing work-related strain and motivation [25]. The first is a health impairment process, whereby jobs with high or chronic job demands such as haematology nursing drain employees' physical and mental resources and result in adverse outcomes, such as compassion fatigue and turnover intentions [24]. The second is a motivational process, in which job resources are assumed to promote work engagement and bring about positive outcomes, including organisational commitment and intention to stay [24].

Inconsistent findings were reported on the associations between demographic and occupational characteristics, job demands, support from colleagues, ProQOL, and turnover intentions of oncology and haematology nurses. Besides that, there is a paucity of research that examines perceived job demands and resources and how these factors influence nurses' ProQOL and turnover intentions, specifically among haematology nurses, as all the studies reviewed considered haematology and oncology nurses as a homogenous group. Therefore, this study aimed to assess the perceived work demands, levels of social support from colleagues, ProQOL, and turnover intentions among haematology nurses in Singapore and examine whether demographic and occupational characteristics, perceived job demands, and support from colleagues were associated with haematology nurses' professional quality of life and turnover intentions. The constructs and variables measured in this study are summarised in Figure 1 using the JD-R model.

2. Methods

2.1. Research Design and Sample. This study employed a descriptive, correlational design to measure the perceived job demands, support from colleagues, ProQOL, and turnover intentions in haematology nurses and explore the relationships among the variables. Data were collected using a cross-sectional online survey. A convenience sample of registered and enrolled nurses with at least six months of haematology experience working at two inpatient haematology wards at a large tertiary hospital in Singapore was recruited for the study. Advanced practice nurses, resident

nurses, and nurses in management roles, including nurse managers and nurse clinicians, were excluded from the study due to differing job scopes and work demands. Nurses on leave during the data collection period were also excluded. 112 nurses met the inclusion criteria. Participants were recruited through two avenues. A recruitment e-mail containing information about the study and a QR code and link to the survey was sent to all eligible nurses who met the inclusion criteria. A follow-up e-mail reminder was sent one week after the initial invitation. In addition, face-to-face information sessions were conducted during daily ward staff meetings for clarifications regarding the study and to enhance participation.

2.2. Data Collection. Data were collected over two weeks in October 2021 via Form.gov.sg, a secure self-service online form builder. Participants could review information about the study on the survey web page before answering the questions. Consent was implied when participants submitted a completed survey. Participants were reassured that they could take a break or choose not to complete or submit the survey at any time during the survey process if the questions made them uncomfortable. The survey included demographic and occupational data questions and three instruments to measure workplace demands, support from colleagues, ProQOL, and turnover intentions. Each section was prefaced with introductory information on the variables measured and instructions on selecting the response options. Upon submission of the survey, all responses were stored in an encrypted format on the Form.gov.sg server, and only research team members could view the data.

2.3. Outcome Measures and Instruments. In this study, job demands were conceptualised as quantitative, cognitive, and emotional demands. Quantitative demands refer to the number of tasks nurses have to achieve during their work and whether they have sufficient time to complete these tasks in a satisfactory manner [26]. Cognitive demands are tasks or duties requiring the nurses' mental effort [26, 27]. Besides that, haematology nurses experience emotional demands when they manage the emotions of patients and their loved ones at work [26]. Job resources were examined through nurses' perceptions of whether they could obtain support from their colleagues when necessary [26]. ProQOL was chosen as the work-related outcome to investigate haematology nurses' well-being and the development of work-related strain and motivation in this study. Haematology nurses care for patients who go through suffering and highly stressful events and are likely to experience both positive and negative feelings associated with the care they provide. ProQOL provides a balanced perspective of the positive and negative aspects of haematology nursing, including compassion satisfaction and compassion fatigue. This study also examined turnover intentions to determine whether haematology nurses' perceived levels of job demand, support from colleagues, and ProQOL are predictors of their intention to leave.

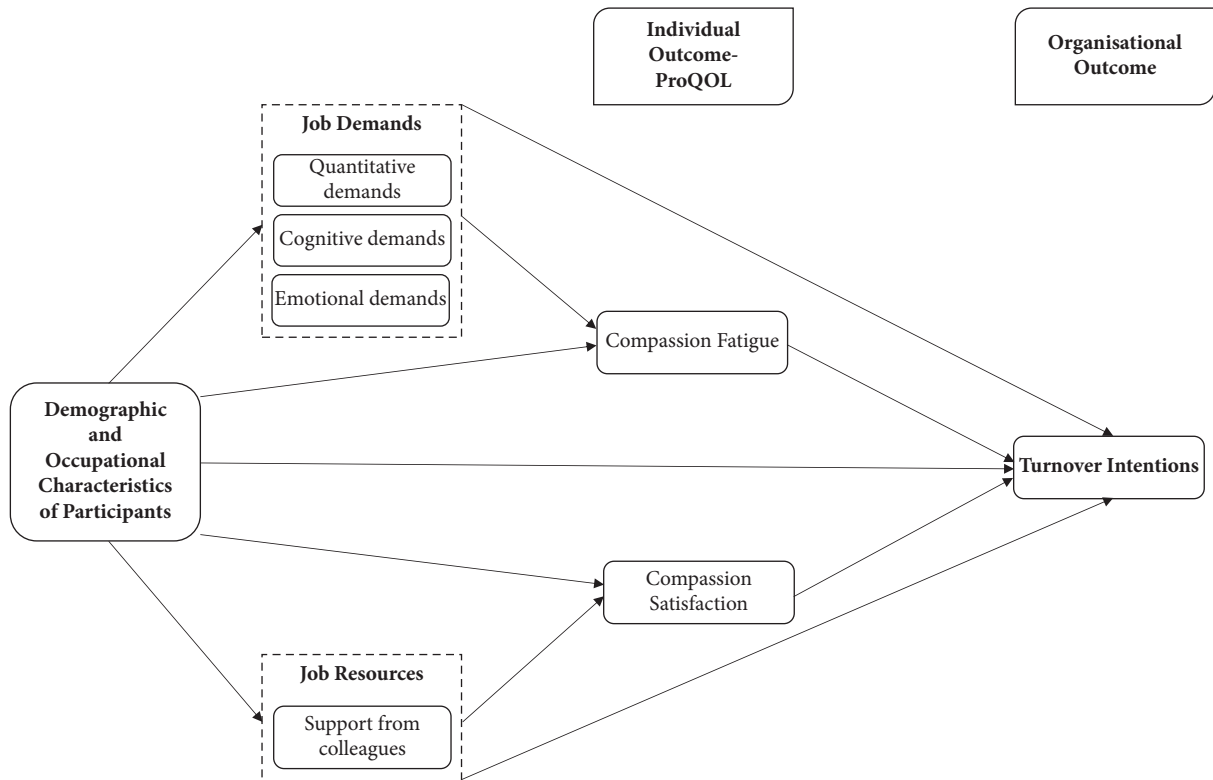


FIGURE 1: Summary of the constructs and variables measured using the JD-R model.

This study combined three independently validated instruments and specific demographic and occupational data questions to measure the variables of interest. The instruments used included the third version of the Copenhagen Psychosocial Questionnaire (COPSOQ III), the Professional Quality of Life Scale version 5 (ProQOL5), and the 6-item Turnover Intention Scale (TIS-6).

2.3.1. Copenhagen Psychosocial Questionnaire (COPSOQ III). A short version of the COPSOQ III, comprising 45 items, was used to collect data on perceived job demands and social support received at work. The COPSOQ III is a public instrument. Therefore, the use of the questionnaire did not require consent on the condition that guidelines set out by the COPSOQ International Network were adhered to [28]. The COPSOQ III has been tested for validity and reliability in many countries worldwide and is widely used to assess psychosocial conditions in the healthcare industry [28]. Cronbach's alpha for the psychosocial dimensions under demands at work ranged from 0.77 to 0.80 [26]. For the dimension of social support from colleagues, Cronbach's alpha was reported to be 0.87 [26]. The short version used for this study was adapted based on the COPSOQ International Network guidelines [28]. The survey included mandatory items labelled CORE in the COPSOQ III and was supplemented by items labelled MIDDLE or LONG from the dimensions of interest [28]. Participants were asked to select the most appropriate response for each question on a 5-point Likert scale. Each question was scaled to the intervals 0 to 100, with each response having equal weight [28]. The mean

score for each dimension was calculated by adding up the scores of each item under that dimension and obtaining the average [26, 28]. A mean composite score was computed for overall job demands based on the average scores of the three dimensions. Higher scores indicate greater job demands and more social support received on a range of 0 to 100.

2.3.2. Professional Quality of Life Scale (ProQOL5). The ProQOL5 is commonly used to measure the positive and negative effects experienced by people working in a helping profession, such as nurses, and has three subscales: compassion satisfaction, burnout, and secondary traumatic stress [16]. The burnout and secondary traumatic stress subscales were combined to measure compassion fatigue [16]. The instrument's validity and reliability have been established through extensive research, with Cronbach's alpha for the three subscales ranging between 0.72 and 0.87 [16]. The ProQOL Office at the Center for Victims of Torture provided permission to use the scale for this study.

The ProQOL5 is a 30-item instrument that uses a 5-point Likert scale with responses ranging from *never* to *very often* (1 = never, 5 = very often) [16]. Participants were asked to select the response that best reflected the frequency of each experience in the last 30 days. For this survey, the words in the italicised brackets were changed to *nurse* or *nursing* to help participants read the scale smoothly, as suggested in the ProQOL manual [29]. Each subscale is comprised of ten questions. Compassion satisfaction was measured using questions 3, 6, 12, 16, 18, 20, 22, 24, 27, and 30 [16]. Questions 1, 4, 8, 10, 15, 17, 19, 21, 26, and 29 were used to

measure the burnout component [16]. Secondary traumatic stress was measured by the remaining questions [16]. The scores for each subscale were added up, and the mean scores for burnout and secondary traumatic stress were combined to obtain the mean score for compassion fatigue. Cutoff scores for each subscale were also calculated based on a quartile system proposed in the ProQOL manual to identify participants with low, moderate, or high levels of compassion satisfaction, burnout, and secondary traumatic stress [16]. Finally, the scores for each subscale were converted to *t* scores for comparison and further analysis [16].

2.3.3. Turnover Intention Scale (TIS-6). The 6-item Turnover Intention Scale (TIS-6), adapted from a 15-item scale developed by Roodt [30], was used to measure haematology nurses' intention to leave the organisation [31]. The TIS-6 was developed based on the Theory of Planned Behavior and was determined to be a reliable and valid scale used to measure turnover intentions or predict actual turnover, with a Cronbach's alpha of 0.80 [31]. In addition, exploratory factor analysis was conducted to establish the factorial validity of the scale, with item loadings ranging between 0.73 and 0.81 [31]. Responses to the TIS-6 were measured on a 5-point Likert scale [31]. A total score was obtained by adding all item scores, and the midpoint of the scale, which is 18, was used as a cutoff to indicate turnover intention. The author provided permission to use the TIS-6 for this study.

2.4. Ethical Considerations. Ethics approval was obtained from the SingHealth Centralised Institutional Review Board (Reference number: 2021/2564). Participation in this study was entirely voluntary. Eligible nurses were provided with information about the study, study participation, contact information of the investigators, survey sections, and estimated time required to complete the survey in the recruitment e-mail and survey web page. Research team members answered all questions regarding the study and survey. Participants were informed that consent was implied when they submitted a completed survey, but they could not withdraw from the study after their responses were recorded due to the anonymity of the survey. The survey was anonymous to ensure privacy and confidentiality. No personal data that made the participants identifiable were collected. Once submitted, all survey responses were encrypted end-to-end and stored in an encrypted format on the Form.gov.sg server. Data collected were kept confidential. A private key was generated during the survey form creation to ensure that only research team members had access to the responses. Research data were stored according to institution policy.

2.5. Data Analysis. All survey responses were exported to Microsoft Excel, where the data were labelled, coded, and checked for missing values. Reverse scoring for specific items in the COPSOQ III and ProQOL5 was performed in Microsoft Excel. The response data were then imported to SPSS v27.0 for analysis. Descriptive statistics were employed to describe and analyse the demographic and occupational

characteristics of the participants, perceived job demands, support from colleagues, subscales of ProQOL, and turnover intentions. Statistical tests used included frequency distribution, mean, range, and standard deviation. The chi-square test was utilised to assess for significant associations between turnover intentions and the demographic and occupational characteristics of the participants. Some demographic and occupational characteristics data were regrouped before the test was performed. Next, standard multiple regression was carried out in three parts. The first regression analysis was performed to identify factors that significantly predict perceived job demands and support from colleagues. The subsequent analysis examined the factors predicting ProQOL in the participants. Finally, the last standard multiple regression was used to determine whether perceived job demands, colleague support, and ProQOL were significant predictors of turnover intentions. The assumptions of multiple regression analysis, including multivariate outliers, multicollinearity, normality, linearity, and homoscedasticity of residuals, were assessed and met in all models. A significance level (*p* value) of less than 0.05 was used to determine statistical significance.

3. Results

3.1. Characteristics of Participants. A total of 60 respondents completed the surveys with a response rate of 54%. Based on the sample size of 60 in this study, power analysis was performed. The power of the test to detect a large effect (Cohen's $f^2 = 0.35$) was 0.858, a medium effect (Cohen's $f^2 = 0.15$) was 0.454, and a small effect (Cohen's $f^2 = 0.02$) was 0.088. Each respondent answered all the survey questions; therefore, all 60 responses were included in the data analysis. Participants' demographic and occupational characteristics are summarised in Table 1. There were 28 participants aged between 21 and 30 (46.7%), and the remaining were between 31 and 60 years of age ($n = 32$, 53.3%). The majority of the participants were female ($n = 51$, 85%). There was an even distribution between participants who were single ($n = 32$, 53.3%) and married ($n = 28$, 46.7%). More than half of the participants do not have children ($n = 35$, 58.3%). With respect to the highest education qualification, 48.3% of the participants held a bachelor's degree ($n = 29$), 25% had a diploma ($n = 15$), and 11.7% had an advanced diploma ($n = 7$). Senior staff nurses and staff nurses represented 40% ($n = 24$) and 36.7% ($n = 22$) of the study sample, respectively. Assistant Nurse Clinicians made up the smallest number of responses ($n = 3$, 5%). Most of the participants ($n = 53$, 88.3%) reported being on rotating shifts. The haematology experience of the participants ranged from 1 to 33 years, with a mean of 9 years and a standard deviation (SD) of 7.65 years. The reported nursing experience of participants ranged from 1 to 40 years, with a mean of 11.99 years and an SD of 9.94 years.

3.2. Perceived Job Demands and Social Support from Colleagues. The participants reported a mean job demands score of 56.61 (SD = 12.81). The quantitative, cognitive, and

TABLE 1: Demographic and occupational characteristics of participants ($N=60$).

Characteristics of participants	n	%
<i>Age</i>		
21–25	13	21.7
26–30	15	25.0
31–35	11	18.3
36–40	5	8.3
41–45	2	3.3
46–50	4	6.7
51–55	7	11.7
56–60	3	5.0
<i>Gender</i>		
Female	51	85.0
Male	9	15.0
<i>Marital status</i>		
Single	32	53.3
Married	28	46.7
<i>Have child/children</i>		
Yes	25	41.7
No	35	58.3
<i>Highest education</i>		
Nitec in nursing	5	8.3
Diploma	15	25.0
Advanced diploma	7	11.7
Bachelor's degree	29	48.3
Master's degree	1	1.7
Others	3	5.0
<i>Job position</i>		
Enrolled nurse	2	3.3
Senior enrolled nurse	6	10.0
Principle enrolled nurse	3	5.0
Staff nurse	22	36.7
Senior staff nurse	24	40.0
Assistant nurse clinician	3	5.0
<i>Shift pattern</i>		
Rotating	53	88.3
Fixed	7	11.7
<i>Years of working experience</i>		
Haematology	Mean (SD) 9.00 (7.65)	Min–Max 1.0–33.0
Nursing	11.99 (9.94)	1.0–40.0

emotional demands scores were 41.46 (SD = 15.27), 69.90 (SD = 14.67), and 58.47 (SD = 20.21), respectively. The mean score for social support from colleagues was 65.42, with a standard deviation of 19.71. Participants reported a maximum score of 100 for cognitive demands, emotional demands, and social support from colleagues. In terms of cognitive demands, 53.3% ($n=32$) and 58.3% ($n=35$) of the participants selected “Always” as a response to the questions “Do you have to keep your eyes on lots of things while you work?” and “Does your work require that you remember a lot of things?”, respectively. For emotional demands, 58.3% ($n=35$) of the respondents indicated that their work was emotionally demanding to a large or very large extent. On the other hand, 21.7% ($n=13$) of the participants answered “Always” when asked, “How often do you get help and support from your colleagues, if needed?”

3.3. Professional Quality of Life. Table 2 presents the ProQOL raw scores and levels reported by the participants. The mean raw compassion satisfaction, burnout, and secondary traumatic stress scores were 36.20 (SD = 7.07), 25.93 (SD = 5.54), and 25.32 (SD = 6.37), respectively. The mean raw compassion fatigue score was 25.63 (SD = 5.40). The cutoff scores for each subscale were calculated based on a quartile system proposed in the ProQOL manual. Majority of the participants reported moderate to high levels of compassion satisfaction ($n=47$, 78.3%). On the other hand, most of the participants reported moderate to high levels of burnout ($n=46$, 76.7%) and secondary traumatic stress ($n=49$, 81.7%).

3.4. Turnover Intentions. The mean turnover intention score was 18.32 (SD = 5.00). A cutoff score of 18, based on the midpoint of the TIS-6 scale, was used to determine turnover intentions. A score of 18 or more indicated that the participant had an intention to leave the organisation. More than half of the participants reported an intention to leave the organisation ($n=32$, 53.3%).

3.5. Relationships between Demographic and Occupational Characteristics, Perceived Job Demands, Social Support from Colleagues, Professional Quality of Life, and Turnover Intentions. Initial standard multiple regression models revealed that there is no association between demographic and occupational characteristics and participants' perceived job demands and job resources (all $p > 0.05$). Next, both perceived job demands and job resources were entered as independent variables, together with the demographic and occupational characteristics, in the standard multiple regression analysis to determine their predictive relationships on the ProQOL of participants. Two models were constructed, one each for compassion satisfaction and compassion fatigue. Table 3 presents the results of the two standard multiple regression models. In the compassion satisfaction model, highest education qualification ($B=8.59$, $p=0.001$) and job demands ($B=-0.31$, $p=0.002$) were identified to be significant predictors of compassion satisfaction. Education level was a positive predictor of compassion satisfaction, while job demands were negatively associated with compassion satisfaction. The two variables accounted for a significant 48% of the variability in the participants' compassion satisfaction ($R^2=0.48$, $p \leq 0.001$). In the compassion fatigue model, only job demands were significantly associated with compassion fatigue ($B=0.249$, $p=0.015$). Job demands significantly accounted for 32% of the variance in compassion fatigue reported by the participants ($R^2=0.32$, $p=0.009$).

Finally, the relationships between the participants' demographic and occupational characteristics, perceived job demands, job resources, ProQOL, and turnover intentions were investigated using the chi-square test and standard multiple regression analysis. The chi-square test showed no significant association between the sample characteristics and turnover intentions (all $p > 0.05$). Therefore, only years of haematology experience was entered into a standard

TABLE 2: Professional quality of life ($N = 60$).

Subscales	<i>n</i> (%)	Mean	SD	Min	Max
<i>Compassion satisfaction</i>		36.20	7.07	20	50
High	14 (23.3)				
Moderate	33 (55.0)				
Low	13 (21.7)				
<i>Burnout</i>		25.93	5.54	13	44
High	12 (20.0)				
Moderate	34 (56.7)				
Low	14 (23.3)				
<i>Secondary traumatic stress</i>		25.32	6.37	14	44
High	12 (20.0)				
Moderate	37 (61.7)				
Low	11 (18.3)				
<i>Compassion fatigue*</i>		25.63	5.40	15	42

*Combined mean score of burnout and secondary traumatic stress. Cutoff scores proposed in the ProQOL manual based on a quartile system. Compassion satisfaction: low = 30 or less; moderate = between 31 and 42; high = 43 or more. Burnout: low = 21 or less; moderate = between 22 and 30; high = 31 and more. Secondary traumatic stress: low = 19 or less; moderate = between 20 and 30; high = 31 or more.

multiple regression analysis with perceived job demands, job resources, compassion satisfaction, and compassion fatigue to estimate the proportion of variance in turnover intentions that can be accounted for by these variables. Table 4 presents the results of the standard multiple regression analysis. In the constructed model, only job demands ($B = 0.168$, $p \leq 0.001$) and compassion fatigue ($B = 0.187$, $p = 0.016$) were identified to be significant predictors of turnover intentions. Both job demands and compassion fatigue were positively associated with turnover intentions. The two variables accounted for a significant 54% of the variability in turnover intentions of the participants ($R^2 = 0.54$, $p \leq 0.001$).

4. Discussion

Overall, the participants in this study reported a moderate level of workplace demands ($M = 56.61$, $SD = 12.81$). The results revealed that the nurses reported a higher level of cognitive ($M = 69.90$, $SD = 14.67$) and emotional ($M = 58.47$, $SD = 20.21$) job demands compared to quantitative ($M = 41.46$, $SD = 15.27$) demands. This finding is consistent with previous studies [6, 9]. More than half of the participants in this study reported that they always must keep an eye on and remember lots of things while working. This reflects the nature of haematology nursing, as the nurses are accountable for administering complex treatment regimens and monitoring patients for treatment side effects and chemotherapy toxicities [4, 6]. Besides that, 58.3% of the participants expressed that their work was emotionally demanding to a large or very large extent. The personal attachment that haematology nurses develop towards the patients and families due to repetitive treatment cycles and witnessing the suffering and death of the patients under their care could be the reasons for the high perceived emotional demands [6, 9]. Therefore, providing haematology nurses with specialised training and frequent updates on the management of patients undergoing complex haematology

treatments and support on emotion management may help relieve the cognitive and emotional work demands on haematology nurses [7].

This study indicated that participants received a high level of social support from their colleagues ($M = 65.42$, $SD = 19.71$). This finding is notable as previous studies have suggested that support from colleagues helped oncology and haematology nurses to cope with difficult situations and stress at work [10, 12, 14]. Besides that, support from colleagues is a critical job resource that could enable haematology nurses to complete their tasks on time, which could explain the lower quantitative job demands reported by the participants in this study [24]. Hence, it is crucial to continue promoting teamwork and peer support among haematology nurses to protect them from the harmful effects of job-related stress and improve work engagement [24].

The compassion satisfaction ($M = 36.20$, $SD = 7.07$), burnout ($M = 25.93$, $SD = 5.54$), and secondary traumatic stress ($M = 25.32$, $SD = 6.37$) scores reported by the participants in this study were within the range reported in the existing literature that examined ProQOL in oncology and haematology nurses [15, 17–20]. However, the mean compassion satisfaction score reported by participants in this study was lower than those reported in Western countries, including the United States, Canada, and Portugal [15, 17, 20]. This finding suggests that haematology nurses in Singapore derive less professional satisfaction from their work than oncology and haematology nurses working in Western countries, which is likely due to the differences in the work environment and cultures between different countries [16]. In contrast, the mean burnout and secondary traumatic stress scores identified in this study are higher than those of most previous studies [15, 17, 19, 20]. Therefore, haematology nurses may experience more exhaustion and stress and are exposed to more traumatic stressful events at work compared to a homogenous population of oncology and haematology nurses [16].

Based on the cutoff scores proposed in the ProQOL manual, most of the participants in this study reported moderate to high levels of compassion satisfaction. However, most of the participants also reported moderate to high levels of burnout and secondary traumatic stress. This finding is congruent with the study conducted by Arimon-Pagès et al. [21]. This suggests that despite being rewarding and meaningful, the positive aspects of haematology nursing do not necessarily negate the burnout and stress experienced by haematology nurses [21]. Therefore, retention strategies should be aimed at both improving the professional well-being of haematology nurses and providing them with job-related and personal skills to perform their work effectively and cope with stressful events at work [10, 17, 21].

Giarelli et al. [11] found that only 2 out of 20 haematology nurses had intentions to leave oncology nursing. However, the results of this study revealed that 53.3% of the 60 haematology nurses surveyed had an intention to leave the organisation. This finding was similar to the results of previous studies conducted [18, 20, 21]. This high percentage of nurses expressing an intention to leave highlights a concern as turnover intentions are positively related to

TABLE 3: Standard multiple regression model testing demographic and occupational characteristics, perceived job demands, job resources, and ProQOL.

Model	Independent variable	B	SE	β	p	R ²	P
Compassion satisfaction						0.481	≤0.001
	Age	2.750	3.598	0.138	0.448		
	Marital status	-1.667	5.318	-0.084	0.755		
	Have children	5.441	4.956	0.270	0.277		
	Highest education	8.586	2.325	0.433	0.001**		
	Haematology experience	0.140	0.351	0.107	0.691		
	Nursing experience	0.279	0.290	0.277	0.341		
	Job demands	-0.310	0.095	-0.397	0.002**		
	Job resources	0.051	0.056	0.100	0.371		
Compassion fatigue						0.316	0.009
	Age	-1.890	3.740	-0.105	0.615		
	Marital status	1.880	5.528	0.104	0.735		
	Have children	-2.689	5.152	-0.148	0.604		
	Highest education	-2.600	2.416	-0.145	0.287		
	Haematology experience	0.132	0.365	0.111	0.719		
	Nursing experience	-0.323	0.302	-0.355	0.289		
	Job demands	0.249	0.099	0.352	0.015*		
	Job resources	-0.101	0.058	-0.220	0.089		

B: unstandardised coefficients; SE: standard error; β : standardised coefficients; p: significance levels of variables; P: significance levels of model; * $p < 0.05$; ** $p < 0.01$.

TABLE 4: Standard multiple regression model testing years of haematology experience, perceived job demands, job resources, ProQOL, and turnover intentions.

Model	Independent variable	B	SE	β	p	R ²	P
Turnover intentions						0.540	≤0.001
	Haematology experience	-0.077	0.068	-0.118	0.258		
	Job demands	0.168	0.043	0.432	≤0.001**		
	Job resources	0.044	0.026	0.175	0.088		
	Compassion satisfaction	-0.054	0.068	-0.109	0.428		
	Compassion fatigue	0.187	0.076	0.340	0.016*		

B: unstandardised coefficients; SE: standard error; β : standardised coefficients; p: significance levels of variables; P: significance levels of model; * $p < 0.05$; ** $p < 0.01$.

actual turnover [31]. High staff turnover can, in turn, bring about significant consequences for the organisation, such as workforce shortage and poor quality of care and costs for rehiring and training of nurses [31]. Therefore, nursing leaders must understand and improve factors that influence haematology nurses' turnover intentions to retain them in the organisation and profession.

In terms of factors that predict perceived job demands and support from colleagues, no association was found between the demographic and occupational characteristics of participants and their perceived job demands and job resources. This finding suggests that haematology nurses' perceived job demands and resources are primarily influenced by the work environment and aspects of their job instead of individual characteristics.

Among the demographic and occupational characteristics of the participants, the highest education qualification was found to be the only significant predictor of compassion satisfaction. This finding is supported by previous research conducted [15, 18]. Haematology nurses with higher education qualifications may be better equipped with knowledge of the haematology disease processes and patient management, which allows them to provide better quality care to

patients and derive more satisfaction from their work [15]. Hence, organisations should encourage and support nurses in pursuing further education and training to improve their ProQOL.

This study also revealed that age, marital status, and years of experience in nursing and haematology did not predict compassion satisfaction or compassion fatigue. This is different from findings in previous studies in which age [15, 17, 18], marital status [18], and years of nursing and oncology experience [15, 18, 19] were found to be significantly associated with the ProQOL of participants. This could be related to the cultural differences between haematology nurses in Singapore and those overseas. One interesting finding to note is that years of haematology and nursing experience were not predictors of ProQOL. This may indicate that contrary to popular beliefs, experienced haematology nurses neither derive more satisfaction from their work nor are at higher risk for compassion fatigue due to their years of experience than early career haematology nurses. Experienced haematology nurses may have been exposed to more negative effects and stressful events from work compared to early career nurses [15, 17]. However, in their years of experience, they may also have gathered more

knowledge and expertise to cope with these difficult situations, which moderates the effect on compassion fatigue [15, 17].

Existing qualitative studies indicated that workplace demands could be a precipitating factor for compassion fatigue as nurses are prevented from having ample time to interact with patients and provide quality care [10–13]. The findings from this study confirm past literature and the health impairment process in the JD-R model, in which job demands were found to be significant predictors of compassion fatigue. Furthermore, this study revealed that job demands were negatively associated with compassion satisfaction. As suggested by previous studies, high job demands could prevent haematology nurses from spending sufficient time with patients and providing quality patient care, as nurses need to complete their tasks satisfactorily and keep their eyes on many things concurrently [10–13]. Besides increasing compassion fatigue, this can also cause haematology nurses to experience incongruence between their expectations and the actual patient care provided, leading to lower compassion satisfaction [15]. Therefore, organisations need to provide adequate support for haematology nurses to cope with the demands at work to increase their professional satisfaction and reduce their experience of compassion fatigue.

Perry et al. [13] revealed that colleague support helped reduce the experience of compassion fatigue in oncology nurses. Similarly, Wu et al. [15] reported that perceptions of team cohesiveness reduced oncology nurses' likelihood of experiencing compassion fatigue and increased the compassion satisfaction derived by the nurses. In contrast, this study found that social support from colleagues was not significantly associated with both compassion satisfaction and compassion fatigue in haematology nurses in Singapore. This finding challenges the second proposition of the JD-R model, which suggests that job resources promote work engagement in employees [25]. Therefore, further studies are warranted to investigate the effects of other job resources, including autonomy, supervisor support, and meaning of work, on haematology nurses' ProQOL.

Finally, this study found that job demands and compassion fatigue were significant predictors of turnover intentions for haematology nurses in Singapore. This finding is well supported by previous literature and the JD-R model [8, 12, 13, 18, 20–22, 25]. Existing studies indicate that job demands have significant effects on oncology and haematology nurses' coping, exhaustion, and satisfaction at work, which could influence their decision to leave the organisation or profession [6–9]. Besides that, haematology nurses might face challenges juggling between demands at work and their personal lives, leading to intentions to leave [22]. Similarly, compassion fatigue can have adverse effects on haematology nurses, including physical and psychological exhaustion, difficulty in establishing and maintaining personal relationships, and negative attitudes towards work [12, 13]. These effects could potentially influence haematology nurses' intention to leave the organisation, discipline, or profession [12, 13]. Hence, in addition to helping haematology nurses cope with job demands, interventions must

be taken to reduce burnout and secondary traumatic stress experienced by this group of nurses to retain them in the discipline and organisation.

This study is one of the few that addressed haematology nurses as a heterogeneous sample instead of classifying them as a subset of oncology nurses. The study also contributed to understanding how each variable interacts to influence work-related strain, professional satisfaction, and turnover intentions in haematology nurses. Despite that, this study had some design-related limitations that should be noted. Inferences about causal relationships could not be made in this study as a cross-sectional design was used. A second limitation of this study was the sampling bias related to using a convenience sample. The nurses who chose to participate in the study might not represent the population, limiting the generalisability of the study's findings. Using self-administered surveys for data collection can eliminate interviewer bias and allow participants to remain anonymous. However, self-reports are more susceptible to response biases, which might distort the findings. Finally, the small sample size limits the power to detect medium and small effect and generalisability of the study findings. Therefore, it is recommended that the study is replicated with a large random sample from multiple centres or countries to improve the generalisability of the findings. Researchers can also conduct a longitudinal study to examine the long-term effects of job demands on haematology nurses' ProQOL and turnover intentions. Besides that, future research can consider exploring other predictors that influence the above psychosocial factors and outcomes, including personality and resilience of participants, autonomy, and supervisor support.

5. Implications for Nursing Management

Nursing leaders and nurse managers can engage nurses in conversations to understand their needs and how the organisation can support them in managing demands at work [11]. Strategies can be developed at organisation level to improve the workplace environment to help nurses cope with work demands and enhance their professional quality of life. For example, organisations can provide education and training for haematology nurses to equip them with the specialised knowledge, skills, and competencies to cope with the demands at work. Training programs can focus on haematology disease processes and patient management, emotion management skills, and building resilience to improve the well-being of haematology nurses and prevent compassion fatigue [21, 32]. Besides that, organisations can adopt technology and informatics, such as wearable devices and smart pumps, to reduce workplace demands placed on haematology nurses. Nursing leaders can also establish formal support mechanisms such as counselling and debriefing sessions for nurses to express their emotions and grief after the loss of a patient to prevent or reduce compassion fatigue in haematology nurses [21, 22]. More emphasis can be placed on mental health of haematology nurses and promoting self-care to cope with the emotional demands at work and reduce the effects of compassion fatigue [11, 12].

6. Conclusion

This study revealed that haematology nurses in Singapore face high cognitive and emotional demands at work. Although most of the nurses reported moderate to high compassion satisfaction, the majority of them also experienced moderate to high levels of burnout and secondary traumatic stress. Job demands significantly predict the ProQOL of haematology nurses. Besides that, both job demands and compassion fatigue were significant predictors of turnover intentions in haematology nurses. The high percentage of haematology nurses reporting an intention to leave the organisation in this study highlights an urgent need to implement strategies to help nurses cope with the high work demands and reduce their levels of compassion fatigue, to improve staff retention.

Data Availability

The data used to support the findings of this study have not been made available due to confidentiality.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' Contributions

Sheng Lian Tan conceptualised and designed the study with feedback and input from Phillip R Della and Huaqiong Zhou. Data collection was conducted by Huimin Jazreel Thian. Sheng Lian Tan and Huaqiong Zhou analysed and interpreted the data. Sheng Lian Tan wrote the manuscript with input from Huimin Jazreel Thian and critical review from Phillip R Della and Huaqiong Zhou.

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Supplementary Materials

STROBE checklist for cross-sectional studies. (*Supplementary Materials*)

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Research Article

Influence of Surgery Preparation Time on Patient Outcomes

Hey-Jin Jang  and Sun-Mi Lee 

College of Nursing, The Catholic University of Korea, Seoul, Republic of Korea

Correspondence should be addressed to Sun-Mi Lee; leesunmi@catholic.ac.kr

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Aims. This study aimed to analyze the effects of the surgery preparation time on patient outcomes. **Background.** Postoperative complications have a decisive effect on postoperative survival. The anesthesia time is a crucial determinant of such complications. Competent operating room nurses can shorten the surgery preparation time, which is the time from when anesthesia is first administered to the making of the surgical incision. The shortening of this preparation time can shorten the anesthesia time and may reduce postoperative complications. However, discussion of this preparation time is insufficient. Therefore, this study analyzed the effect of the surgery preparation time on patient outcomes. **Methods.** From electronic health records data, this retrospective cohort study used the data of 1,944 patients who had been immediately admitted to the ICU after their surgery between 2017 and 2020. The patients were divided into two groups: ≥ 30 minutes preparation time and < 30 minutes preparation time groups. We performed chi-squared tests and *t*-tests to determine differences in preoperation, intraoperation, and post-operation characteristics of the patients and patient outcomes based on the surgery preparation time. Furthermore, we performed a multiple logistic regression by including 12 adjusted variables to determine the influence of the surgery preparation time on patient outcomes. **Results.** Among the 1,944 patients, 820 were in the ≥ 30 minutes preparation time group and 1,124 in the < 30 minutes preparation time group. The multiple logistic regression analysis showed that the surgery preparation time affects alertness (OR = 1.44; 95% CI: [1.09, 1.90]), ventilator application (OR = 1.32; 95% CI: [1.03, 1.70]), and length of stay in the ICU (OR = 1.69; 95% CI [1.16, 2.47]). **Conclusions.** The surgery preparation time affects postoperative patient outcomes. The competence of operating room nurses is the most essential aspect of the surgery preparation time. **Implications for Nursing Management.** It is important to analyze operating room nurses' tasks, standardize the tasks, and educate nurses according to their experience level to reduce the surgery preparation time and improve patient outcomes.

1. Background

The number of surgeries is increasing steeply every year worldwide [1]. While the risk of intraoperative complications is decreasing with the development of medical technologies, the risk of postoperative complications is increasing. Every year, tens of thousands of patients experience postoperative complications [2]. Notably, the risk of postoperative complications is higher in major surgeries than in minor ones, with an incidence rate of up to 25% [3].

Postoperative complications have been found to have a decisive effect on postoperative survival [4]. Reportedly, two million patients die every year due to postoperative complications [5]. In addition, the mortality rate within 60 days of surgery is 3.4 times higher if complications occur

[6]. Common postoperative complications include pain, delirium, pressure ulcers, decreased bowel movement, infection, and bleeding. These complications result in patient outcomes such as admission to the intensive care units (ICUs), prolonged hospitalization, and increased healthcare costs [7–9].

The factors affecting postoperative patient outcomes can be delineated as internal and external. Internal factors are factors related to the patient, such as demographic characteristics, lifestyle, diseases, surgical history, degree of activity, and intraoperative status [10, 11]. External factors are related to the surgical processes, such as the time and method of anesthesia, anesthetic agent, surgery time, surgery site and method, surgery position, and intraoperative specifics [11–13].

Among these factors, the factors that are controllable and can reduce postoperative complications and improve patient outcomes are largely external. Notably, among all external factors, anesthesia time has the most significant influence. Prolonged anesthesia time is associated with the risk of nausea, vomiting, infection, and bleeding as well as venous thromboembolism in serious cases [14]. It contributes to increased length of stay and healthcare costs, as do postoperative complications [15–17].

The anesthesia time can be divided into three periods: the surgery preparation, surgery, and dressing periods. The “surgery preparation period” begins with the initiation of anesthesia and continues until the surgical incision is made [18–21]. During this period, the patient is prepared for surgical positioning [19, 22, 23], while operating room (OR) nurses endeavor to maintain a sterile environment by handling surgical equipment, ensuring cleanliness, and performing sterilization. They also assist the patient in donning the surgical attire and maintaining its sterility. These efforts are aimed at preventing surgical site infections [23–26]. The “surgery time” starts when the surgical incision is made and ends when sutures are made [22, 27, 28]. This is the duration of the surgical procedure and is recorded as the total time on the surgical record sheet. Reducing this duration can positively affect patient outcomes [8, 29, 30]. Finally the “dressing period” spans from the completion of the operation to the time the anesthesia completely ends. During this period, the patient’s condition is checked and necessary disinfection and cleanup actions are performed. This period includes the time taken for the patient to prepare for movement in the operating room.

The surgery preparation time is when the work of OR nurses is the most concentrated. Nursing work performed during the surgery preparation time can be divided into the tasks performed by scrub and circulatory nurses in sterile and nonsterile fields, respectively. Scrub nurses are tasked with various responsibilities aimed at facilitating the surgical procedure. These responsibilities encompass delineating the parameters of the sterile field, arranging sterilized surgical instruments, and aiding the surgical team in donning gloves and gowns [31, 32].

Meanwhile, circulatory nurses primarily handle tasks outside the sterile field in the OR. This includes protecting the integrity of the sterile field, assisting the scrub nurse in the gowning of the surgical team, delivering the items needed for surgery into the sterile field, and arranging the positioning of surgical equipment [25, 26]. Thus, the surgery preparation period is a critical juncture in which OR nurses’ expertise and proficiency exert a significant influence on patient safety and surgical efficiency.

Competent OR nurses can shorten the surgery preparation period, which can shorten the anesthesia time, thereby contributing to reducing the instances of postoperative complications. Most studies have analyzed OR nursing tasks and quantitatively measured the time required to prepare for surgery. Consequently, research remains scant on the association between the surgery preparation time and patient outcomes [18, 19, 21]. Thus, this study aimed to analyze the impact of surgery preparation time on

postoperative patient outcomes, such as the presence or absence of medical interventions.

2. Methods

2.1. Study Design. This was a retrospective cohort study conducted using electronic health record (EHR) data.

2.2. Data Source. This study used an EHR dataset that was created for the primary study to predict pressure injuries in ICUs. This EHR dataset was extracted from the EHR system of the University Hospital in Seoul, South Korea. It contained the clinical data of 6,555 patients who were hospitalized and discharged from medical and surgical ICUs between January 1, 2017, and February 28, 2020. The dataset contained data on 1,106 variables extracted from various sources, such as anesthesia, surgery, and recovery records, nursing information records, clinical observation records, laboratory clinical pathology tests, medication administration records, blood transfusion records, instrument and device insertion and removal records, and nursing diagnoses.

2.3. Study Population. Of the 6,555 individuals enrolled in the primary study, we used the data of 1,944 individuals admitted to the ICU immediately after their surgery (Figure 1). The data of patients who were aged 19 or older and stayed in the ICU for three days or more were included in our analysis. We excluded the data of patients who were admitted to the general ward after surgery and were later transferred to the ICU due to increasing severity.

2.4. Study Variables. From the data source, we used the data on surgery preparation time (the main independent variable), eight patient outcome variables, patient demographic variables, and adjusted variables in our analysis.

2.4.1. Surgery Preparation Time. Owing to a lack of a standard surgery preparation time, criteria for surgery preparation time vary across studies. In this study, the surgery preparation time was considered to be the period between the initiation of anesthesia to the making of the surgical incision. According to previous research, the average surgery preparation time ranges from 10 minutes to 57 minutes [18–21]. In this study, which targeted 1,944 participants, the average surgical preparation time was 30 minutes. Consequently, the study population was classified based on whether their surgery preparation time was 30 minutes or longer (≥ 30 minutes preparation time group) or less than 30 minutes (< 30 minutes preparation time group).

2.4.2. Patient Outcomes. To analyze the impact of the surgery preparation time on patient outcomes, we selected the postoperative patient outcomes, primarily nursing-sensitive ones, that could be observed in the ICU postoperatively. Consequently, eight outcomes were selected: alertness, number of nursing diagnoses related to postoperative

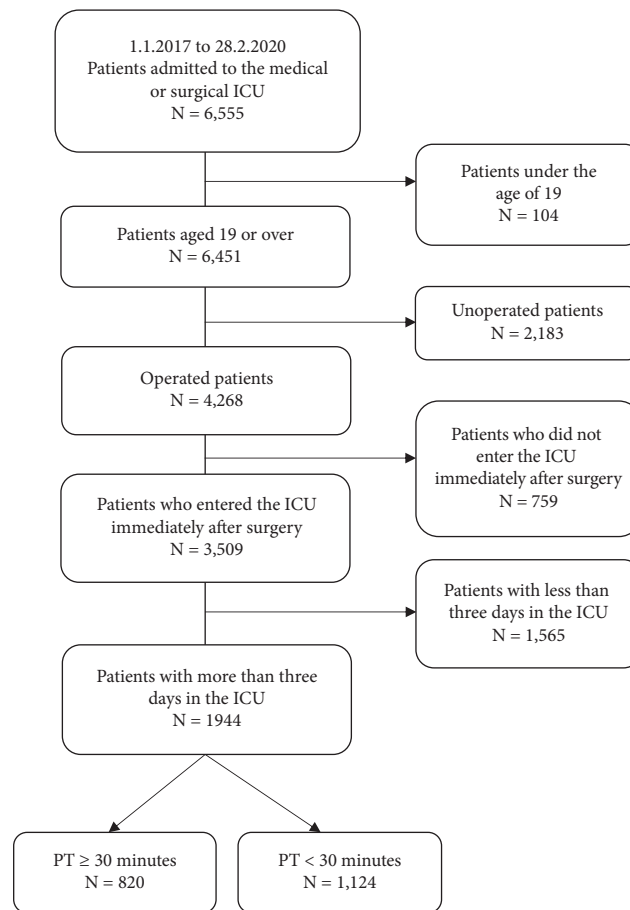


FIGURE 1: Flowchart of the selection of the study population.

complications, respiratory nursing needs score, ventilator application, restraint application, transfusion, use of narcotics, and ICU length of stay (ICU LOS).

The recovery period of surgery patients is classified into three stages: 24 hours to within 7 days, 28 to 60 days, and 6 weeks to 3 months [33]. The first stage of recovery (24 hours to within 7 days) is the acute postoperative phase and a crucial period in postoperative management. Since we speculated that the impact of surgery preparation time would lessen over time after the seven-day mark, we selected postoperative patient outcomes occurring within seven days postoperation as the outcome variables [33].

Alertness was determined based on the percentage of times the patient was found to be alert in the level of consciousness assessment (alert, confusion, drowsy, stuporous, semicoma, and coma) within seven days of being admitted to the ICU. This percentage was categorized as $\geq 50\%$ or $<50\%$. The number of nursing diagnoses related to postoperative complications was determined based on the daily average number of diagnoses over seven days of being admitted to the ICU. We selected and analyzed 60 nursing diagnoses related to postoperative complications, such as "impaired gas exchange," "electrolyte imbalance," and "risk of deficient fluid volume," from the diagnoses in use at the time at the target hospital. The daily average number of nursing diagnoses related to postoperative complications per individual was

found to be 5.75. Therefore, we categorized the study population as individuals with >5.75 diagnoses related to postoperative complications and those with ≤ 5.75 diagnoses.

The respiratory nursing needs score is the score of respiratory care needs that is measured daily on a scale from 0 to 82. The higher the score, the more respiratory care needs are evident. In this study, the study population was categorized as individuals with a score of ≤ 2 and those with a score of >2 . The reference score of 2 indicated basic respiratory care needs (such as deep breathing and assisted coughing and the use of a spirometer). Scores greater than two suggest that additional interventions are needed, such as oxygen therapy, suction, or a ventilator.

Regarding ventilator and restraint application, we categorized the study population based on whether they were applied within seven days of being admitted to the ICU. Similarly for transfusion, we categorized the study population based on whether a transfusion was performed within seven days of being admitted to the ICU. The use of narcotics was determined based on whether the narcotic analgesics listed in the medication records were administered within seven days of ICU admission. The ICU LOS was defined as the number of days spanning from ICU admission to discharge. The study population was categorized as individuals who stayed in the ICU for ≤ 7 days and those who stayed for >7 days.

2.4.3. Adjusted Outcomes. From the preoperational, intraoperational, and postoperational factors in the data source, we selected 12 adjusted variables: the body mass index (BMI), score on the American Society of Anesthesiologists Physical Status Classification System (ASA Physical Status Classification System), surgery method, systolic blood pressure (SBP), pulse, surgery time, total recovery time, score on the Acute Physiology and Chronic Health Evaluation (APACHE II), blood urea nitrogen (BUN), creatinine, creatinine phosphokinase (CPK), and lactate dehydrogenase (LDH).

The ASA score evaluates a patient's physical condition before surgery. This score was categorized as normal (I), mild systemic disease (II), severe systemic disease (III), severe systemic disease having a constant threat to life (IV), not expected to survive without the operation (V), or brain-dead patient for donation (VI).

The surgery method was categorized as surgery with scope, surgery without scope, or undefined based on the name of the operation. We classified the surgery method based on the use of a scope because using a scope has a grave impact on the surgical approach as well as the work environment of OR nurses [20, 34]. More specifically, scope-assisted surgeries require specific equipment, such as endoscopic instruments (SCOPE), CO₂, intraabdominal illumination (light cable), and specially modified instruments [34, 35]. The surgery preparation time varies owing to the process of preparing these items.

The SBP and pulse were determined based on the average SBP and pulse during surgery, respectively. The surgery time was calculated as the time starting from the time the incision was made to the time the incision was closed. The total recovery time was defined as the time from PACU admission to transfer to the patient room.

The APACHE II score indicates the severity of the disease within 24 hours of admission to the ICU. The score is calculated based on 12 items (body temperature, mean arterial pressure, blood pH, heart rate, respiratory rate, PaO₂, serum sodium, serum potassium, creatinine, hematocrit, white blood cell count, and Glasgow Coma Scale) and ranges from 0 to 71. Higher scores indicate heightened severity. Finally, among the initial blood tests conducted upon admission to the ICU after surgery, statistically significant results were observed for BUN, creatinine, CPK, and LDH.

2.5. Data Analysis. The study population was divided into two groups: the group with a surgery preparation time of 30 minutes or longer and the group with a surgery preparation time of less than 30 minutes. Chi-squared tests were performed on categorical variables, while continuous variables were analyzed using a *t*-test. Then, we performed a multiple logistic regression analysis by including the 12 adjusted variables to identify the impact of the surgery preparation time on the eight patient outcomes. These statistical analyses were performed using SAS version 9.4.

2.6. Ethical Considerations. This study was conducted after obtaining approval from the research institution's Data Utilization Review Board and Institutional Review Board

(KC23RISI0254). Personally identifiable data were deleted and replaced with numbers for safe management of the data used in this study.

3. Results

3.1. Preoperation, Intraoperation, and Postoperation Characteristics of the Study Population. Table 1 presents the results of analyzing preoperation, intraoperation, and postoperation characteristics of the study population based on the surgery preparation time. Among the study population, 820 individuals had a surgery preparation time of ≥ 30 minutes, while 1,124 had a surgery preparation time of < 30 minutes. The mean preparation time was 45.08 minutes in the ≥ 30 minutes preparation time group and 18.45 minutes in the < 30 minutes preparation time group.

The age and sex of the study population did not differ significantly between the two groups of the surgery preparation time ($p > 0.05$). In the preoperative period, the proportion of obese patients (those with a BMI of > 23 kg/m²) was higher in the ≥ 30 minutes preparation time group (48.05%) than in the < 30 minutes preparation time group (39.15%; $p < 0.001$). Furthermore, the proportion of patients with ASA classifications II and III was higher in the ≥ 30 minutes preparation time group (54.76%; $p < 0.001$). Meanwhile, the proportion of patients with ASA classifications IV and V was higher in the < 30 minutes preparation time group (51.51%; $p < 0.01$), indicating a comparatively higher degree of severity.

During the intraoperative period, the proportion of patients who underwent surgery with a scope was higher in the ≥ 30 minutes preparation time group (16.10%; $p < 0.01$), while patients who underwent surgery without scope were more in number in the < 30 minutes preparation time group (69.13%; $p < 0.01$). The proportion of patients with an SBP of ≥ 120 mmHg (39.77%; $p > 0.001$) and those with a pulse rate of ≥ 100 /minute (13.70%; $p < 0.01$) was higher in the < 30 minutes preparation time group. However, the surgery time (285.10 ± 149.22 min) was longer in the group with ≥ 30 minutes of preparation time ($p < 0.001$).

In the postoperative period, the recovery time (77.05 ± 32.59 min) was longer in the group with more than 30 minutes of preparation time ($p < 0.05$). In addition, levels of BUN (34.95 ± 28.05 mg/dL) and creatinine (2.99 ± 3.21 mg/dL) were higher in the group with less than 30 minutes of preparation time ($p < 0.001$ for both). However, CPK levels (239.07 ± 282.45 U/L) and LDH levels (725.10 ± 536.85 U/L) tended to be significantly higher in the group with more than 30 minutes of preparation time ($p < 0.001$ for both) (Table 1).

3.2. Influence of the Surgery Preparation Time on Postoperative Patient Outcomes. Table 2 presents the results of analyzing the eight postoperative patient outcomes based on the surgery preparation time. Five of the eight outcomes differed significantly based on the surgery preparation time. The ≥ 30 minutes preparation time group had a higher proportion of patients with less than 50% alertness (29.02%;

$p < 0.05$), those with a score of >2 for respiratory nursing needs (36.22%; $p < 0.05$), those who had undergone a transfusion (56.59%; $p < 0.01$), those who had been administered narcotics (62.68%; $p < 0.001$), and those who stayed in the ICU for >7 days (13.90%; $p < 0.001$).

Table 3 presents the results of the multiple logistic regression analysis. The surgery preparation time had a statistically significant effect on alertness, ventilator application, and ICU LOS. The ≥ 30 minutes preparation time group was at high risk for less than 50% alertness (OR = 1.44; 95% CI: [1.09, 1.90]) and ventilator application within seven days of being admitted to the ICU (OR = 1.32; 95% CI: [1.03, 1.70]). It was also at a high risk of staying in the ICU for more than seven days (OR = 1.69; 95% CI: [1.16, 2.47]).

4. Discussion

We included 12 adjusted variables in our analysis and found that a longer surgery preparation time lowers the rate of alertness within seven days of the operation and increases the likelihood of ventilator application and extension of the ICU LOS.

The significant decrease in the level of consciousness with an increase in the surgery preparation time is presumed to be due to the accompanying increase in the anesthesia time. General anesthesia impacts the nervous system [36] and, consequently, the level of consciousness. Therefore, shortening the surgery preparation time (and, in turn, shortening the overall anesthesia time) can affect the patient's level of consciousness after surgery. Improving the capacity of OR nurses can help shorten the surgery preparation time and improve patients' level of consciousness after surgery.

Studies have found that the "BMI, BUN, creatinine, surgery time, and surgery method, and scores on the ASA and APACHE II," prolong ICU LOS [37–42]. However, in this study, the surgery preparation time increased ICU LOS even after adjusting for these variables. Regarding surgery or medical treatment, studies have reported that the determinants of ICU LOS are primarily patients' intrinsic factors or factors on which nurses' influence is weak. This study removed the intrinsic and medical factors and confirmed that the surgery preparation time (a factor on which OR nurses' influence is the most concentrated) affects ICU LOS. Considering that the competence of OR nurses can reduce the surgery preparation time, positive patient outcomes can be expected if their competency is enhanced and thus efficient preparation time management becomes possible.

After adjusting for factors related to the patient's condition, we found that there is a higher risk of ventilator application when the surgery preparation time exceeds 30 minutes. In other words, when patient condition and surgical-related variables are similar, patients with longer surgical preparation times are at a higher risk of requiring mechanical ventilation. This finding suggests that the length of the surgery preparation time affects the occurrence of ventilator application.

Previous studies have highlighted BMI and surgery time as key factors influencing ventilator application [43–47]. However, this study revealed that the surgery preparation time, which can be controlled by OR nurses, may influence ventilator application. This finding contributes to the research on OR nursing and patient outcomes and emphasizes the importance and influence of OR nursing [48]. It also confirms the importance of OR nurses in the surgical process. From this perspective, further research on the surgery preparation time is imperative for enhancing surgical patient outcomes.

In the univariate analysis, respiratory nursing needs, transfusion, and use of narcotics differed significantly based on the surgery preparation time. However, these factors became statistically insignificant in the multiple logistic regression analysis. This result indicates that factors that have been found to influence respiratory nursing needs, transfusion, and use of narcotics in previous studies, such as BMI, score on the ASA, surgery time, and type of surgery, may act in combination [49–56]. Patients with higher scores on the ASA exhibit greater respiratory nursing needs [49]. Furthermore, as the surgery duration increases, the volume of bleeding typically increases, thereby raising the likelihood of requiring transfusions [57, 58]. This, in turn, may lead to the increased use of narcotic analgesics to manage pain. Consequently, it can be inferred that factors related to patient condition and surgical parameters exert a more significant influence on elevating the respiratory nursing needs score and the risks associated with transfusions and narcotics use, rather than the surgery preparation time. Further research is warranted on the surgery preparation time to enhance surgical outcomes for patients.

The number of nursing diagnoses related to postoperative complications did not differ significantly based on the surgery preparation time. Previous studies have indicated that patient factors influence nursing diagnoses [49]. However, no significant differences were observed in this study both before and after adjustment. This could be attributed to the fact that this study examined postoperative patient outcomes occurring within seven days of being admitted to the ICU [33]. Considering that the early stages of postsurgery are centered on preventing complications, the number of nursing diagnoses related to postoperative complications may have remained relatively constant or uniform during the 7-day period.

Finally, the surgery preparation time had no statistically significant impact on the use of physical restraint. Physical restraint is used to keep the treatment instruments in place and prevent injuries from falls or self-removal of medical devices [59]. It is recommended not to restrain patients physically, but the ICU seems to be an exception [59, 60]. It can be speculated that physical restraint was used in most cases in this study, considering that this study targeted ICU patients [61–63] and the higher likelihood of its use among patients on ventilator support.

This study investigated the impact of reducing the surgery preparation time (and, consequently, the anesthesia time) on patient outcomes. Some studies have suggested methods to reduce the surgery preparation time by focusing on the arrival time of the surgeon to the OR [18]. The

TABLE 1: Preoperation, intraoperation, and postoperation patient characteristics ($N=1,944$).

Variable	Categories	Surgery preparation time		χ^2/t	P value	
		≥ 30 minutes ($n=820$) n (%) or mean \pm SD	<30 minutes ($n=1,124$) n (%) or mean \pm SD			
<i>Surgery preparation time (minutes)</i>		45.08 \pm 17.07	18.45 \pm 6.16	-42.70	<0.001	
<i>Preoperation</i>						
	Age	59.80 \pm 15.24	59.46 \pm 16.04	-0.47	0.64	
	Sex			0.08	0.78	
		Male	310 (37.80)	692 (61.57)		
		Female	49 (5.98)	432 (38.43)		
	BMI (kg/m^2)	<18.5	73 (6.49)	15.52	<0.001	
		18.5–23	377 (45.98)	611 (54.36)		
		>23	394 (48.05)	440 (39.15)		
	ASA	I	71 (8.66)	79 (7.03)	42.81	<0.001
		II, III	449 (54.76)	466 (41.46)		
		IV, V	300 (36.59)	579 (51.51)		
<i>Intraoperation</i>						
	Surgery method	With scope	132 (16.10)	134 (11.92)	12.15	0.002
		Without scope	507 (61.83)	777 (69.13)		
		Undefined	181 (22.07)	214 (18.95)		
	SBP (mmHg)	<120	586 (71.46)	677 (60.23)	26.28	<0.001
		≥ 120	234 (28.54)	447 (39.77)		
	DBP (mmHg)	<60	188 (22.93)	228 (20.28)	1.97	
		≥ 60	632 (77.07)	896 (79.72)		
	Pulse (bpm)	<100	740 (90.24)	970 (86.30)	6.97	0.04
		≥ 100	80 (9.76)	154 (13.70)		
	Surgery time (minutes)		285.10 \pm 149.22	207.94 \pm 139.51	-11.57	<0.001
	Dressing time (minutes)		8.70 \pm 3.99	8.47 \pm 3.51	-1.30	0.19
<i>Postoperation</i>						
	Total recovery time (minutes)		77.05 \pm 32.59	74.03 \pm 30.13	-2.07	0.06
	APACHE II		12.50 \pm 5.49	14.53 \pm 6.11	7.67	<0.001
	BUN		22.24 \pm 20.95	34.95 \pm 28.05	11.44	<0.001
	Creatinine		1.53 \pm 1.97	2.99 \pm 3.21	12.33	<0.001
	CPK		239.07 \pm 282.45	169.33 \pm 233.16	-5.78	<0.001
	LDH		725.10 \pm 536.85	636.56 \pm 434.80	-3.88	<0.001

SD, standard deviation; BMI, body mass index; ASA physical status classification system (I, a normal healthy patient; II, a patient with mild systemic disease; III, a patient with severe systemic disease; IV, a patient with severe systemic disease that is a constant threat to life; V, a moribund patient who is not expected to survive without the operation); SBP, systolic blood pressure; DBP, diastolic blood pressure; surgery time, time from incision to close; dressing time, time from close to the end of anesthesia; APACHE II score, acute physiology and chronic health evaluation; BUN, blood urea nitrogen; CPK, creatinine phosphokinase; LDH, lactate dehydrogenase.

surgeon's timely arrival to the OR shortens the endotracheal tube repositioning time and ensures a quicker process of confirming the position of equipment and devices. However, other studies have argued otherwise. One study reported that the surgeon's OR arrival time does not have a significant impact on the surgery preparation time [64]. Due to this discrepancy in the findings, we could not establish clear evidence of the shortening of the surgery preparation time in relation to the surgeon's OR arrival time.

Many studies have stated that the surgery preparation time is a source of inefficiency and an aspect that needs improvement in the OR workflow, regardless of the surgical site [65–67]. However, technological advances are transforming the OR environment and surgery methods [18, 34, 68]. Now, even the same surgery method requires highly specialized competencies due to the various surgery methods used by each surgeon and department [22, 24, 65, 69–71]. The time that connects these varied surgical environments and surgery methods is the surgery

preparation time. That is, the surgery preparation time depends on the competency of the OR nurses who adapt to the changes in the OR environment and understand the various surgery methods [18].

OR nurses are unique and irreplaceable professionals in healthcare. They are responsible for guaranteeing intraoperative safety and managing and controlling intraoperative asepsis, instrument use, infection and complications, biological samples, and the technology to be employed in the OR [32]. However, the rapid changes in surgery methods and equipment increase the surgery preparation time [20]. As the surgery preparation time extends, tension intensifies during this period, resulting in an escalated workload at this stage [72]. Consequently, it makes the tasks of OR nurses more complex. Despite this, OR nursing is relatively undervalued, and the appropriate nursing cost is yet to be established [73]. Therefore, further research is needed on the surgery preparation time and specific tasks of OR nurses during this period.

TABLE 2: Results of analyzing postoperative patient outcomes based on the surgery preparation time ($N = 1,944$).

Variable	Categories	≥30 minutes	<30 minutes	χ^2/t	P value
		($n = 820$)	($n = 1,124$)		
		n (%) or mean \pm SD			
Alertness	<50%	238 (29.02)	381 (33.90)	5.19	0.02
	≥50%	582 (70.98)	743 (66.10)		
ICU LOS(days)	>7	114 (13.90)	77 (6.85)	26.61	<0.001
	≤7	706 (86.10)	1047 (93.15)		
Ventilator application	Yes	620 (75.61)	884 (78.65)	2.5	0.11
	No	200 (24.39)	240 (21.35)		
Respiratory nursing needs score (daily average)	>2	297 (36.22)	353 (31.41)	4.94	0.03
	≤2	523 (63.78)	771 (68.59)		
Transfusion	Yes	464 (56.59)	563 (50.09)	8.03	0.004
	No	356 (43.41)	561 (49.91)		
Use of narcotics	Yes	514 (62.68)	594 (52.85)	18.71	<0.001
	No	306 (37.32)	530 (47.15)		
Number of nursing diagnoses related to postoperative complications (daily average)	>5.75	402 (49.02)	557 (49.56)	0.05	0.82
	≤5.75	418 (50.98)	567 (50.44)		
Restraint application	Yes	204 (24.88)	230 (20.46)	2.19	0.14
	No	616 (75.12)	894 (79.54)		

SD, standard deviation; ICU, intensive care unit.

TABLE 3: Results of determining the influence of the surgery preparation time on postoperative patient outcomes ($N = 1,944$).

Variable	Category	B	OR (CI)
Alertness	<50%	0.1829	1.44 (1.09–1.90)
ICU LOS (days)	>7	0.2627	1.69 (1.16–2.47)
Ventilator application	Yes	0.1393	1.32 (1.03–1.70)
Respiratory nursing needs score (daily average)	>2	-0.0919	0.83 (0.67–1.04)
Transfusion	Yes	-0.0039	0.99 (0.80–1.23)
Use of narcotics	Yes	-0.0341	0.93 (0.74–1.20)
Number of nursing diagnoses related to postoperative complications (daily average)	>5.75	-0.0785	0.86 (0.70–1.05)
Restraint application	Yes	0.1052	1.23 (0.95–1.61)

ICU: intensive care unit; LOS: length of stay; adjusted variables: BMI (Body Mass Index), ASA (physical status classification system), surgery method, SBP (systolic blood pressure), pulse, surgery time, total recovery time, APACHE II (Acute Physiology and Chronic Health evaluation) score, BUN (blood urea nitrogen), creatinine, CPK (creatinine phosphokinase), and LDH (lactate dehydrogenase).

5. Implications and Limitations

This study has important implications for nursing management, as it examined the relationship between postoperative patient outcomes and the surgery preparation time, a period during which OR nurses play a crucial role. The findings emphasize the significance of the surgery preparation time and the need to raise awareness about the importance of OR nursing. Based on the results, we propose several policy recommendations for OR nursing management.

First, it is crucial to conduct a precise analysis of the tasks performed during the surgery preparation time, a period when most OR nursing tasks are performed. Despite advancements in surgical techniques and methods and the surgical environment, there remains a lack of discussion on the surgery preparation time. This is evident in the continued reliance on two OR nurses, regardless of changes in the surgical environment and methods, without considering variations in surgery types or complexities. Although tasks during the surgery preparation time may seem routine, they involve various elements based on theoretical knowledge

and principles. This situation indicates that despite an increase in the workload of OR nurses compared to that in the past, the current distribution system fails to reflect these changes adequately. Therefore, there is a need to reassess and adjust the work structure and processes of OR nurses. This will provide a foundation for reducing the surgery preparation time.

Second, a standardized framework must be developed for the surgery preparation time. A standardized process must be created for the surgery preparation time based on factors such as the surgical site, technique, and position to minimize errors and enhance efficiency, which would ultimately reduce the preparation time and help save costs.

Third, the OR is one of the most specialized areas within a hospital. Therefore, a lack of sufficient understanding of and proficiency in the preoperative preparation process can significantly reduce work efficiency [74–76]. Thus, OR nurses' qualifications should be redefined in terms of knowledge, skills, attitude, and experiences, and education programs must be developed to address individual educational needs [64, 76, 77]. Finally, it is essential to move away

from the traditional nursing education framework that focuses on “preoperative nursing” and “postoperative nursing.” Instead, it is important to define “intraoperative nursing” and widely communicate its importance to provide a new perspective on the role of OR nurses.

This study has some limitations. First, we did not include environmental and structural factors of ORs and the ICU because they were not included in the data source. Second, an intrinsic bias must be acknowledged, as this study was a retrospective data analysis of a single institution. Finally, the generalizability of our results is limited because the study population was limited. Nonetheless, this study offers a new perspective on the clinical aspect of surgical nursing education, serving as a turning point in explaining the importance of “quantitative” nursing beyond the existing “qualitative” nursing perspective. Such an approach aims to foster a deeper understanding of the role and education of OR nurses, emphasizing the impact of nursing during surgery on patient recovery and treatment processes. The findings of this study are expected to provide important implications for the education and practice of OR nurses.

6. Conclusion

This study shows that a surgery preparation time exceeding 30 minutes reduces the rate of alertness, prolongs the patient’s stay in the ICU, and increases the likelihood of ventilator application. Thus, the surgery preparation time should be estimated based on the surgical environment and methods from the moment a surgical schedule is confirmed to improve patient outcomes. In addition, efforts should be made to establish an efficient and reasonable management system for environmental, structural, and workforce issues to ensure that the surgery preparation time is handled efficiently according to the surgery method.

Data Availability

The data utilized in this paper are not available for sharing due to the inclusion of patient personal information and privacy or ethical restrictions.

Conflicts of Interest

The authors hereby declare that they have no potential conflicts of interest pertaining to the research, authorship, or publication of this article. There is no conflict of interest between Ms. Jang and the corresponding author.

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Research Article

Influences of Nursing Professionalism, Empathy, and Clinical Decision-Making Ability on Shared Decision-Making Awareness among Hemodialysis Nurses

Junghwa Yun,¹ Mihyeon Seong ,² Youngmi Cho ,³ and Sohyune Sok ⁴

¹Department of Nursing, Graduate School, Kyung Hee University, Seoul, Republic of Korea

²DKMediinfo Nursing Information Research Institute, Changwon-si, Gyeongsangnam-do, Republic of Korea

³Department of Nursing, Sun Moon University, Asan-si 31460, Chungcheongnam-do, Republic of Korea

⁴College of Nursing Science, Kyung Hee University, Seoul, Republic of Korea

Correspondence should be addressed to Sohyune Sok; 5977sok@khu.ac.kr

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Aim. To examine the relationships among nursing professionalism, empathy, and clinical decision-making ability and the factors influencing shared decision-making awareness in hemodialysis nurses. **Background.** Self-management and treatment for hemodialysis patients are essential for maintaining health and life in daily life. In this process, shared decision-making in which patients, nurses, and medical teams participate and make decisions together has a greater impact on the health recovery and improvement of quality of life for hemodialysis patients than for any other chronic disease patients. **Methods.** A cross-sectional descriptive design was employed. Participants were 145 nurses working in the hemodialysis centers at hospitals in Seoul and Gyeonggi-do. Measures included the general characteristics of study participants, nursing professionalism, empathy, clinical decision-making ability, and shared decision-making awareness. Data were collected from May to July, 2022, and multiple linear regression analysis was used to examine the predictive factors of shared decision-making awareness. **Results.** The strongest predictor was empathy, followed by clinical decision-making ability and the level of education. The explanatory power of the final regression model was 23%. **Conclusions.** Empathy towards hemodialysis patients was an important factor influencing the shared decision-making awareness in hemodialysis nurses. **Implications for Nursing Management.** In nursing management, nursing managers or nurses should pay attention to influencing factors to improve the shared decision-making awareness of hemodialysis nurses. Empathy towards hemodialysis patients need to be reinforced to improve the shared decision-making awareness of hemodialysis nurses.

1. Introduction

In hemodialysis, self-management such as regular dialysis, fluid and dietary restrictions, drug treatment, and vascular monitoring is essential for maintaining health and life in daily life.

Disease awareness and self-care management have a positive relationship [1], and in the case of hemodialysis patients, patients with positive disease awareness are compliant with treatment [2], and the disease perception of patients who applied the shared decision-making was relatively positive, and it was found to have a positive effect on clinical indicators and patient prognosis [3]. However, since

the shared decision-making is influenced by the attitude of healthcare providers who lead the decision-making process, it is necessary to identify the shared decision-making awareness of medical personnel [4–6].

Shared decision-making is based on a shared mental model, which is the perception of, understanding of, or knowledge about a situation or process that is shared among team members through communication [7, 8]. The complexity and criticality of the current healthcare system require shared mental models to enhance safe and effective patient/client care [8, 9]. Each member's action can have an advantage in terms of efficiency, function, and strategy by using clear

communication and guidance among team members in the shared decision-making process, and by sharing an understanding of goals and expectations towards a better quality of life for the patient [7, 9–11]. In a previous study [6], it was mentioned that the role of nurses in the shared decision-making process included being a health educator, spokesman, data collector, symptom and side effect manager, information sharer, and psychological supporter. Moreover, they said that nurses play a complementary role [5, 12] to doctors in the shared decision-making process and promote shared decision-making [13]. These characteristics are suitable for playing the role of a multidisciplinary coordinator as a member of a team in the shared decision-making process, and these allow nurses to integrate the biological and social life experiences of patients with chronic diseases in the shared decision-making process [9]. Since hemodialysis nurses spend several hours a week with long-term dialysis patients during treatment, a close therapeutic relationship can be formed [14, 15] and, thus, occupies a key position in terms of patient involvement [16, 17]. Likewise, nurses' awareness of patient participation is important as they play various roles in the entire hemodialysis process [10, 18]. An important factor that can contribute to patient compliance during hemodialysis treatment is the hemodialysis nurse's attitude toward patient participation [19]. Walker et al. [20] evaluated the influence of the dialysis nurse as high as that of the nephrologist in the decision-making process for the patient's choice of renal replacement therapy. In the literature on the role of nephrology specialists in renal replacement therapy, dialysis nurses want to be involved in shared decision-making [21]. However, in South Korea, realistic hospital medical systems and diverse nursing situations exclude nurses from shared medical decision-making, and some nurses also do not know how to participate in shared decision-making [3, 22]. Therefore, it is necessary to identify the factors that affect hemodialysis nurses' awareness of the shared decision-making process for preparing a strategy to improve this decision-making process.

A literature review found that nursing professionalism [14], critical thinking tendency [23], awareness of nursing organizational culture [23], and empathy [5] were reported as the variables correlated with clinical nurses' shared decision-making awareness. Nursing professionalism is a necessary competency in the process of multidisciplinary shared decision-making [14, 24] and provides high-quality nursing through cooperation with various experts in the clinical field, and this allows nurses to perform efficient work [16, 25]. Furthermore, through the establishment of correct professionalism, patients are not excluded from decisions about treatment, but the right to know and autonomy are respected so that they can actively exercise their right to self-determination [10, 26]. Empathy refers to the necessary skills and abilities to understand and alleviate the suffering of others [24]. Empathy has a positive effect on the development of interpersonal relationships, conflict resolution, and facilitated communication [5, 27]. High empathy can provide relief and lower anxiety to patients [5, 28], and can show careful understanding that considers their emotional state and non-verbal expression by identifying their strengths and limitations

[29]. It was found that 82% of patients receiving hemodialysis treatment chose empathy as the main factor in forming a therapeutic relationship between patients and nurses [14]. In recent years, the clinical decision-making ability is regarded as an essential competency of nurses in the medical field, and the demand for it is also increasing [13, 30, 31]. Since nurses play the role of experts as patients' protectors, responsibility and decision-making ability are required of them [27]. When faced with various dilemmas related to human dignity and ethical situations on the medical site, nurses make clinical decisions based on moral behavior and critical thinking [32].

This study uses the King [33] goal attainment theory as its theoretical framework along with a review of previous literature (Figure 1). King's goal attainment theory states that in order to achieve a goal, interaction and exchange of members' perceptions, opinions, and actions are necessary. There are personal, interpersonal, and social levels of interaction and exchange. In order to achieve the goal of shared decision-making awareness, this study reflected the personal level as educational background, the interpersonal level as empathy, and the social level as nursing professional and clinical decision-making ability in interaction and exchange. Therefore, in this study, general characteristics (educational background), empathy, nursing professionalism, and clinical decision-making ability were selected as leading variables that are likely to affect the shared decision-making awareness of hemodialysis nurses (Figure 1). The purpose of this study was to examine the relationships among nursing professionalism, empathy, and clinical decision-making ability and the factors influencing the shared decision-making awareness in hemodialysis nurses.

2. Methods

2.1. Design, Sample, and Settings. A cross-sectional descriptive design was employed. This study was conducted with nurses working in hemodialysis centers at tertiary general hospitals, general hospitals, and private clinics that operate hemodialysis centers located in Seoul and Gyeonggi-do. The criteria for selecting the study subjects are as follows: (1) hemodialysis nurses with at least one year of work experience and (2) those who agreed to participate in this study. The number of subjects was calculated by using the G*power 3.1.9.4 sample number calculation program [34]. Considering the significance level (α) = 0.05, power (1- β) = 0.80, multiple regression median effect size = 0.15, and 13 independent variables, the minimum number of subjects was 131, and the dropout rate was 10%. A total of 145 subjects responded, and all responses were sufficient, so 145 copies (100%) were finally analyzed.

2.2. Instrumentation. Based on a literature review and previous research, a set of general characteristics of the study participants included age, marital status, religion, educational level, total clinical career, hemodialysis career, hospital type, position, and job satisfaction. This consisted of a total of 9 items.

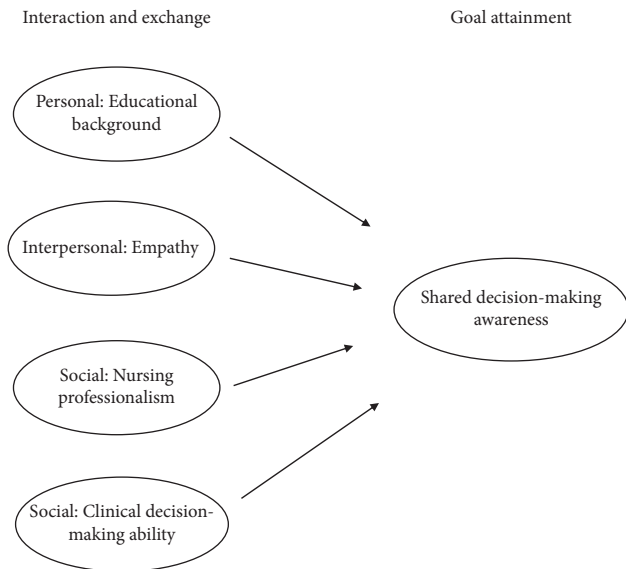


FIGURE 1: Theoretical framework of this study.

The nursing professionalism scale developed by Yeun et al. [25] was used. This scale consists of 29 questions with 5 subdomains: 9 questions on professional self-concept, 5 on nursing professionalism, 8 on social awareness, 3 on nursing independence, and 4 on nursing practice. Each item is made on a Likert 5-point scale, ranging from 1 point for “strongly disagree” to 5 points for “strongly agree,” and reverse calculations were made for opposite content. A high score means that the nursing professionalism was formed positively, and the score range was 29–145. At the time of development, the Cronbach’s α of the scale was 0.92, and in the study of Cho [12], the Cronbach’s α was 0.90, while the Cronbach’s α value of 0.92 was used in this study.

The empathy scale developed by Lee [35] and modified and supplemented by Lee and Seomoon [36] was used to measure the scale of empathy. It consists of 17 questions with 3 subdomains: 8 questions on communication skills, 5 on sensitivity, and 4 on insights. Each item is made on a Likert 5-point scale, ranging from 1 point for “strongly disagree” to 5 points for “strongly agree,” with higher scores indicating a higher empathy. The score range was 17–85. At the time of scale development, Cronbach’s α , which refers to reliability, was 0.91, in the study of Seon [37], Cronbach’s α was 0.89, and in this study, Cronbach’s α was 0.84.

The clinical decision-making ability scale developed by Jenkins [38] and adapted by Baek [39] was used to measure clinical decision-making ability, and it consists of a total of 40 questions. The scale includes four subdomains: examination of alternatives and options, review of values and goals, examination of information, harmonization of new information, and assessment and reassessment of conclusions. Each subdomain consists of 10 questions. Each item is made on a Likert 5-point scale, ranging from 1 point for “strongly disagree” to 5 points for “strongly agree,” with higher scores indicating a higher clinical decision-making ability. The score range was 40–200. At the time of development proposed by Jenkins [38], Cronbach’s α , the

reliability of this scale, was 0.83, Cronbach’s α in the study of Baek [39] was 0.77, and Cronbach’s α in the study of Jang [30] was 0.85. In this study, Cronbach’s α was 0.72.

The shared decision-making awareness scale developed by Jo [22] was used to measure the level of shared decision-making awareness. It consists of a total of 34 questions with 7 subdomains: 9 questions on information sharing, 7 on establishment of a support system, 5 on duty of explanation, 4 on autonomy, 3 on catching timing, 3 on family participation, and 3 on respect for personality. Each item is made on a Likert 5-point scale, ranging from 1 point for “strongly disagree” to 5 points for “strongly agree,” with higher scores indicating a higher awareness. Score range was 34–170. At the time of tool development, Cronbach’s α , an indicator of reliability, was 0.80, and in the study of Noh [28], Cronbach’s α was 0.95. In this study, Cronbach’s α was 0.94.

2.3. Ethical Considerations. This study was conducted after obtaining approval from the Institutional Review Board (IRB no. H-2111-190-1277) of S University Hospital, and the permission from hospital institutes was obtained through the meeting with an explanation. The anonymity and confidentiality of the study were explained to the research subjects, and the study was conducted with the voluntary participation of the study participants who submitted written consent. Researchers explained that the survey will not be used for any purpose other than research and participation can be discontinued at any time during the survey, and even if participation is refused, there will be no disadvantages. Also, the results of the collected questionnaires were managed only by the researcher and were discarded according to the method set by the IRB after the study was completed.

2.4. Data Collection. The duration of data collection was from May to July, 2022. Researchers visited and explained the purpose and contents of this study to the tertiary general hospital, hospital, or private clinic where hemodialysis rooms were operated in Seoul and Gyeonggi-do. After sharing the research description and the URL of the Google survey through which one can participate, study participants fully understood the purpose of the study and voluntarily accessed the shared Google survey URL, followed the consent process, and then responded to the survey. The finished survey using a self-reporting questionnaire was collected by online, and they were managed by the authors. The time taken to finish the questionnaires was around 20–25 minutes.

2.5. Data Analysis. IBM SPSS version 26.0 (IBM Corp., Armonk, NY, USA) statistical software program analyzed the data from this study. The descriptive statistics using frequency, percentage, mean, and standard deviation analyzed the general characteristics of the study participants and the levels of study variables. The independent *t*-test, ANOVA, and Scheffe post hoc test analyzed the differences

in professionalism, empathy, clinical decision-making ability, and shared decision-making awareness according to the general characteristics of the study participants. Pearson's correlation coefficient analyzed the correlations between shared decision-making awareness and related factors. Multiple linear regression statistics analyzed and examined the factors influencing shared decision-making awareness. The statistically significant level of a p value was less than 0.05.

3. Results

The general characteristics of the study participants are shown in Table 1. As for the age distribution of hemodialysis nurses, 53 (36.6%) were under the age of 35, and 40 (27.6%) were over the age of 45. The average age was 38.89 years old. In terms of marital status, 99 (68.3%) were married; in terms of religion, 83 (57.2%) were nonreligious; and in terms of academic background, 76 people (52.4%) graduated from a four-year university, accounting for the largest proportion. Less than 10 years of clinical experience was most common with 52 (35.9%), and the average clinical experience was 14.36 years. In terms of hemodialysis nurse experience, less than 5 years was the most frequent with 55 (37.9%), and the average experience was 8.21 years. As for the type of hospital where they worked, tertiary general hospital accounted for the highest number with 82 (56%), and 117 (80.7%) were general nurses, and 97 (66.9%) responded that they were satisfied with their current workplace (Table 1).

The levels of shared decision-making awareness, nursing professionalism, empathy, and clinical decision-making ability are presented in Table 2. The mean score for shared decision-making awareness was 147.16, which indicates a high shared decision-making awareness when compared to the median value (102 points) of the score range (34–170). The mean score of nursing professionalism was 102.87, which indicates a slightly low nursing professionalism when compared to the median value (104 points) of the score range (68–140). Their mean score for empathy was 66.68, which indicates a low empathy when compared to the median value (69.5 points) of the score range (54–85). The mean score for clinical decision-making ability was 138.26, which indicates a low clinical decision-making ability when compared to the median value (142.5 points) of the score range (120–165) (Table 2).

Correlations among the study variables are shown in Table 3. Shared decision-making awareness had statistically significant, positive relations with nursing professionalism ($r=0.309$, $p<0.001$), empathy ($r=0.422$, $p<0.001$), and clinical decision-making ability ($r=0.395$, $p<0.001$). The higher the level of nursing professionalism, empathy, and clinical decision-making ability, the higher the shared decision-making awareness (Table 3).

The factors influencing shared decision-making awareness are shown in Table 4. Factors influencing shared decision-making awareness were tested on 145 hemodialysis nurses. Data were collected through questionnaires and shared decision-making awareness among the general characteristics and educational level, which showed

a significant difference and were used as predictive variables. Nursing professionalism, empathy, and clinical decision-making ability, which were independent variables that showed statistically significant differences in Pearson's correlation analysis, were also input as predictor variables, and shared decision-making awareness was set as a dependent variable. The collected data were analyzed by using SPSS 26.0. Moreover, there was no outlier larger than the absolute value of 3 when diagnosing cases, so all cases were analyzed with the input method.

First, as a result of testing the regression analysis, all assumptions were satisfied. Durbin–Watson was 1.790, which satisfied Tabachnick [40] criterion of 1.5–2.5. There was no autocorrelation of errors. Furthermore, the correlation coefficients between independent variables were all less than 0.8. As a result of testing multicollinearity by using tolerance limits and VIF values, there was no problem with multicollinearity between variables in which the tolerance limits were less than 0.1 or the VIF values were greater than 10. Then, as a result of analyzing the influence by using Cook's D plot, there was no individual with a value of 1.0 or more among the 145 nurses. In the residual analysis, the linearity and normality of the errors were confirmed with a pictogram, a normal P-P plot of regression standardized residuals, and a normal distribution table. Homoscedasticity was also confirmed as the scatter plot between the standardized residual of the dependent variable and the independent variable did not have a specific distribution, but spread evenly around 0.

After analyzing the regression model, it was found to be significant ($F=11.73$, $p<0.001$). The adjusted coefficient of determination ($AdjR^2$) was 0.23, showing an explanation power of 23%. The factor that had the greatest influence on the hemodialysis nurse's shared decision-making awareness was empathy ($\beta=0.250$, $p=0.012$), followed by clinical decision-making ability ($\beta=0.226$, $p=0.008$) and the educational level ($\beta=0.154$, $p=0.046$) (Table 4).

4. Discussion

The correlation between various study variables and factors influencing shared decision-making awareness was examined. Nursing professionalism had no direct influence on shared decision-making awareness. This is consistent with the results of previous studies [5, 23]. This is thought to be due to the result that the independence area of nursing was the lowest in the subcategories of nursing professionalism. This is because the relationship between doctors and nurses in the medical field is not a horizontal one, but a hierarchical relationship, which limits the ability of nurses to independently make decisions and fulfill their roles [8, 11, 16]. However, when nursing professionalism is established, patients can actively exercise their right to self-determination in the decision-making process during treatment by ensuring the patients' right to know and autonomy in the shared decision-making process [26, 27]. High nursing professionalism raises awareness of ethical decision-making so that nurses can become protectors in the decision-making process of vulnerable subjects, ensuring their participation

TABLE 1: General characteristics of the study participants ($n = 145$).

Variables	Categories	N	%	Mean (SD)
Age (years)	<35	53	36.6	38.89 (8.56)
	35~44	52	35.9	
	45≤	40	27.6	
Marital status	Unmarried	46	31.7	
	Married	99	68.3	
Religion	Not have	83	57.2	
	Have	62	42.8	
Educational level	Associate	35	24.1	
	Bachelor	76	52.4	
	Above master	34	23.4	
Total clinical career (years)	<10.0	52	35.9	14.36 (8.4)
	10.0~19.9	48	33.1	
	20.0≤	45	31.0	
Hemodialysis career (years)	<5.0	55	37.9	8.21 (6.35)
	5.0~9.9	40	27.6	
	10.0≤	50	34.5	
Hospital type	Tertiary general hospital	82	56.6	
	General hospital	25	17.2	
	Private clinic	38	26.2	
Position	General nurse	117	80.7	
	Charge nurse	28	19.3	
Job satisfaction	Satisfaction	97	66.9	
	Dissatisfaction	48	33.1	

TABLE 2: Levels of shared decision-making awareness, nursing professionalism, empathy, and clinical decision-making ability ($n = 145$).

Variables	Mean (SD)	Min	Max	Mean (SD)	Range
Shared decision-making awareness	147.16 (11.74)	114	170	4.33 (0.35)	34~170
Sharing information		3.33	5.00	4.46 (0.40)	1~5
Constructing system		3.00	5.00	4.19 (0.41)	
Explanation duty		3.20	5.00	4.54 (0.40)	
Autonomy		2.25	5.00	4.16 (0.51)	
Capturing time		3.00	5.00	4.38 (0.40)	
Participation of family		2.67	5.00	4.27 (0.50)	
Human respect		2.00	5.00	4.14 (0.58)	
Nursing professionalism	102.87 (13.01)	68	140	3.55 (0.45)	68~140
Self-concept of the profession		2.00	5.00	3.58 (0.53)	1~5
Social recognition		1.75	4.75	3.30 (0.58)	
Professionalism of nursing		2.40	5.00	3.88 (0.48)	
Role of nursing service		1.75	5.00	3.77 (0.51)	
Originality of nursing		1.33	5.00	3.26 (0.67)	
Empathy	66.68 (5.67)	54	85	3.92 (0.33)	54~85
Communication		2.63	5.00	3.89 (0.38)	1~5
Sensitivity		3.00	5.00	4.07 (0.42)	
Insight		2.75	5.00	3.81 (0.43)	
Clinical decision-making ability	138.26 (8.67)	120	165	3.46 (0.22)	120~165
Evaluation and reevaluation of consequences		2.56	4.67	3.64 (0.40)	1~5
Canvassing of objectives and values		2.90	4.60	3.59 (0.29)	
Search for information and unbiased assimilation of new information		3.00	4.40	3.56 (0.31)	
Search for alternatives or options		2.40	3.70	3.02 (0.23)	

in the shared decision-making [14, 41]. Through this development, we could confirm that nursing professionalism is a variable correlated with shared decision-making awareness, as in the results of previous studies [5, 12]. As nursing professionalism is constantly developed and can be

improved through training, advancement through the development and application of educational programs in clinical practice is required [16, 23]. In clinical settings, when patients are hospitalized in an emergency room and suddenly begin hemodialysis, most patients are not provided

TABLE 3: Correlations among study variables ($n = 145$).

Variables	Shared decision-making awareness r (p)	Nursing professionalism r (p)	Empathy r (p)	Clinical decision-making ability r (p)
Shared decision-making awareness	1			
Nursing professionalism	0.309 (<0.001*)	1		
Empathy	0.422 (<0.001*)	0.607 (<0.001*)	1	
Clinical decision-making ability	0.395 (<0.001*)	0.355 (<0.010*)	0.473 (<0.010*)	1

* $p < 0.05$.

TABLE 4: Factors influencing shared decision-making awareness ($n = 145$).

Variables	B	SE	β	t	p	Tolerance	VIF
Constant	61.15	14.41		4.24	<0.001		
Educational level	2.61	1.30	0.154	2.01	0.046*	0.91	1.10
Nursing professionalism	0.04	0.08	0.042	0.45	0.651	0.62	1.61
Empathy	0.52	0.20	0.250	2.54	0.012*	0.55	1.82
Clinical decision-making ability	0.31	0.11	0.226	2.69	0.008*	0.76	1.32

Durbin-Watson's $d = 1.790$ ($1.679 \leq d \leq 1.788$), $\text{Adj}R^2 = 0.23$, $F = 11.73$, $p < 0.001^*$

VIF = variance inflation factor; * $p < 0.05$

with information about the choice of dialysis method and are unable to proceed with shared decision-making [10, 24]. A hemodialysis nurse with a high level of professionalism respects the patient's right to know, provides information that has not been provided, and shows a facilitator who helps patients choose a dialysis method appropriate for their lifestyle through shared decision-making in situations where dialysis must be maintained [12, 14].

The influence of empathy had the greatest effect on shared decision-making awareness. This supports the results of previous studies [5, 28]. Empathy ability was identified as a factor influencing the interpersonal relationship formation of nursing students [42, 43] and facilitated the communication ability of psychiatric nurses [29, 44]. Empathy works as an influencing factor in shared decision-making awareness because this process can form a therapeutic relationship among the patient, family, and healthcare provider, and is performed jointly by forming a positive interpersonal relationship [13, 27]. Moreover, empathy affects communication ability [45], and is a competency required of nurses to understand and care for patients [41, 45], which is consistent with the competency required in the shared decision-making process. The results of previous studies [5, 24] showed that nurses with high education and age showed high empathy, which is partially consistent with the results of this study. Since empathy is a capability that is enhanced by experiential training as well as educational training [44], it is considered that this result emerges because the understanding and experience of the subject could increase as age increases. Therefore, it is necessary to provide practical education and training to improve empathy and enhance shared decision-making awareness. Systemic efforts to reduce the turnover of experienced nurses with high empathy will also be required. Hemodialysis nurses with high empathic ability due to long clinical experience form therapeutic relationships with dialysis patients, enabling patients to make choices with trust in situations of therapeutic choice, and play the role of psychological supporter in the shared decision-making process [13].

Finally, the clinical decision-making ability of hemodialysis nurses was identified as a factor that influences shared decision-making awareness. Applying critical thinking to clinical practice can improve clinical decision-making ability through efficient and prudent responses [31], and make clinical decisions through ethical behavior and critical thinking [32]. Also, critical thinking is an influencing factor that strengthens shared decision-making awareness [23]. Considering these points, clinical decision-making ability

could affect the shared decision-making awareness. However, it is difficult to make a direct comparison since there is no previous study on the relationship between these two factors, so further studies will be needed. Among the subdomains of the clinical decision-making ability, evaluation and reevaluation of consequences had the highest score, while the search for alternatives or options had the lowest score, which is consistent with the results of previous studies [31]. Since there are many emergency situations due to hemodynamic instability during hemodialysis, it is difficult to spend time to investigate and select alternatives, such as emergency room nursing, and the patient's condition and outcome are evaluated after dealing with the emergency [28]. Accordingly, the evaluation and reevaluation of consequences scored the highest [32]. The area of search for alternatives or options for various problems is an important part of clinical decision-making, as well as the evaluation of results. Thus, education and training with respect to considering and selecting alternatives for each situation are required. During the process of hemodialysis, many emergency situations occur due to hemodynamic instability, and in such situations, hemodialysis nurses need high clinical decision-making ability [27, 32]. After the emergency situation is resolved, the process and results are evaluated to prepare alternatives to prevent and deal with hemodynamic instability for the patient during the next dialysis.

4.1. Study Limitations. This study is limited in the scope of sampling, targeting only hemodialysis nurses working in hemodialysis centers located in Seoul and Gyeonggi-do. Moreover, it is difficult to generalize the results of the study because only hemodialysis nurses who agreed to the survey were included even within the sampling range. Above all, since there is a large difference in the hospital environment where dialysis nurses work, reflection of this is very important, and this may be the limitation of this study.

5. Conclusions

In conclusion, nursing professionalism, empathy, and the clinical decision-making ability of hemodialysis nurses were significantly correlated with shared decision-making awareness, and empathy was the most influential factor in shared decision-making awareness as a result of the regression analysis. Awareness was influenced by the clinical decision-making ability and educational level. This study can provide basic data for the development of an intervention

program that can improve the shared decision-making awareness among hemodialysis nurses, and can contribute to patient satisfaction and self-care enhancement through active implementation of shared decision-making in the field by improving shared decision-making awareness.

6. Implication for Nursing Management

Based on this study, hemodialysis nurses are necessary to improve their empathy and clinical decision-making ability toward hemodialysis patients, whose number is rapidly increasing, while also increasing shared decision-making awareness and promoting patient participation in the process. Ultimately, this will improve the quality of clinical nursing for hemodialysis patients by promoting self-treatment, safe dialysis, and stable management of various chronic diseases, thereby improving their quality of life. Creating an environment to improve shared decision-making awareness of hemodialysis nurses and related training would be essential. Therefore, nursing managers need to pay attention to factors influencing shared decision-making awareness of hemodialysis nurses. Furthermore, it is necessary to develop an intervention program to raise shared decision-making awareness and conduct an experimental study to verify its effectiveness. This study is significant because it could provide basic data to prepare strategies to improve the shared decision-making awareness of hemodialysis nurses.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

The study was approved by the Institutional Review Board of Seoul National University Hospital (IRB no. H-2111-190-1277).

Conflicts of Interest

The authors report no actual or potential conflicts of interest.

Authors' Contributions

Study design: JY, MS, SS; Data collection: JY, MS, SS; Data analysis: JY, MS, YC, SS; Study supervision: SS; Manuscript writing: JY, MS, SS; Statistical advice, re-writing, review, editing: JY, MS, YC, SS; Critical revisions for important intellectual content: JY, MS, YC, SS; All authors are in agreement with the content of the manuscript.; All authors gave final approval of the version to be published.

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Research Article

Job Resources and Core Self-Evaluation as Predictors of Nurse Engagement and Patient-Safety Outcomes: A Longitudinal Study

Dan Luo ¹, Xuening Yang,² Yamei Bai,¹ Yulei Song ¹, Baoyun Chen ², and Ya Liu ²

¹School of Nursing, Nanjing University of Chinese Medicine, Nanjing, Jiangsu, China

²Nursing Department, Xuzhou Central Hospital, Xuzhou, Jiangsu, China

Correspondence should be addressed to Yulei Song; songyulei1986@126.com, Baoyun Chen; aghjkl@sina.com, and Ya Liu; liuya771210@163.com

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Background. Work engagement and patient-safety outcomes in nursing practice are critically significant. However, most previous studies evaluating antecedents of work engagement and patient-safety outcomes have used cross-sectional designs. **Aims.** To investigate the effects of job resources (organizational support and leader empowerment) and core self-evaluation on nurses' work engagement and patient-safety outcomes. **Methods.** This longitudinal study surveyed 2,618 registered nurses from 17 public hospitals in XuZhou, China. Participants completed self-report questionnaires on organizational support, leader empowerment, and core self-evaluation at baseline. Work engagement and patient-safety outcomes were collected 18 months after the baseline. The mixed linear regression and Johnson–Neyman statistical analysis were used to analyze data. **Results.** Organizational support was an outside predictor of nurses' work engagement, followed by core self-evaluation and leader empowerment. Organizational support and core self-evaluation were equally crucial for predicting patient-safety outcomes. Moreover, the positive impact of leader empowerment on patient-safety outcomes became significant when the core self-evaluation score was below 51. **Conclusions.** This study demonstrated that organizational support, leader empowerment, and core self-evaluation are important determinants of nurses' work engagement and patient-safety outcomes. **Implications for Nursing Management.** Hospital managers and nurse leaders should consider providing multiple supports to motivate staff nurses to engage in work. When nurses' core self-evaluation is low, empowering training for nurse leaders should be essential to reduce adverse patient events.

1. Background

Work engagement has stimulated constant interest as it is closely related to nurses' work effectiveness, patient outcomes, and institutional costs [1]. Work engagement is a positive, fulfilling, work-related state of mind with three fundamental dimensions: vigor, dedication, and absorption [2]. International Council of Nurses has recognized the need for nurses committed to high-quality standards and engaged in their work in the implementation of global action on patient safety and achieving universal health coverage [3]. However, the level of engagement among nurses is often reported to be low, and the COVID-19 pandemic has worsened it [4].

The literature shows that both job and individual-level resources are essential predictors of nurses' work engagement [5]. Organizational support is a kind of job resource, which provides resources, reinforcement, encouragement, and communication to employees [6]. Nurses who experience more organizational support report higher work performance and engagement levels [7, 8]. In addition, empowerment is also a precious job resource that plays a crucial role in the professional growth of nurses [9]. Leader empowerment is defined as the giving or delegation of power and authority. Several studies have shown that nurse leaders' empowering behaviors, specifically psychological and structural empowerment, positively affect nurses' work engagement [10, 11].

Personality traits such as core self-evaluation are also closely correlated with work engagement among nurses. Core self-evaluation describes an individual's evaluation of themselves and combines four core traits: self-esteem, generalized self-efficacy, neuroticism, and locus of control [12]. A significant and expanding body of research in business and psychology correlates higher levels of employees' core self-evaluation with better work engagement [13]. Previous research on nurses' personality traits and work engagement has focused on optimism, resilience, introspection, sensibility, and hardiness [14, 15]. Though limited studies have examined the effect of core self-evaluation on work engagement among nurses, studies have shown that core self-evaluation is significantly associated with burnout [16], the polar opposite of engagement. According to the Nursing Job Demands-Resource (JD-R) Model [17], adequate job resources, combined with more incredible personal strengths, increase the possibility of nurses experiencing higher levels of work engagement. However, no empirical study has explored the interaction effects of organizational support or leader empowerment and core self-evaluation on the engagement of nurses. Based on these theoretical and empirical arguments, we hypothesize the following points:

Hypothesis 1a. Organizational support will predict nurses' work engagement

Hypothesis 1b. Leader empowerment will predict nurses' work engagement

Hypothesis 1c. Core self-evaluation will predict nurses' work engagement

Hypothesis 1d. The interaction effect of organizational support and core self-evaluation on nurses' work engagement will be statistically significant

Hypothesis 1e. The interaction effect of leader empowerment and core self-evaluation on nurses' work engagement will be statistically significant

An emergent amount of evidence supports that nurses' work engagement is associated with patient-safety outcomes [18, 19]. Typical adverse patient-safety outcomes formulated by the American Nurses Association include falls, pressure ulcers, healthcare-associated infections, medication errors, patient complaints, and verbal abuse [20]. One recent scoping review estimated that a median of 10% of patients were affected by at least one adverse event [21], which led to death and high medical costs. Organizational support is known as an important resource to enhance nurses' job performance [22], which plays a central role in promoting patient safety. However, few empirical studies have directly explored the relationship between organizational support and patient-safety outcomes. Researchers have linked patient-safety outcomes to leader empowerment. A review of the literature indicates that workplace empowerment is critical for nurses to implement person-centered care and promote patient safety [23]. Correctly identifying the patient

before conducting any nursing operations can be fundamental to ensuring patient safety in hospitals. Kim and Kim found that leader empowerment was positively associated with nurses' patient identification behaviors [24].

Core self-evaluation has proven to be an essential predictor of nurses' clinical decision-making [25], which can guarantee patient safety [26]. However, no studies have directly explored the relationship between nurses' core self-evaluation and patient-safety outcomes. Furthermore, there exists a significant knowledge gap about how job resources in nursing affect patient-safety outcomes from the perspective of core self-evaluation. The following hypotheses are derived from these empirical arguments:

Hypothesis 2a. Organizational support will predict patient-safety outcomes

Hypothesis 2b. Leader empowerment will predict patient-safety outcomes

Hypothesis 2c. Core self-evaluation will predict patient-safety outcomes

Hypothesis 2d. The interaction effect of organizational support and core self-evaluation on patient-safety outcomes will be statistically significant

Hypothesis 2e. The interaction effect of leader empowerment and core self-evaluation on patient-safety outcomes will be statistically significant

In summary, research on nurses' work engagement and patient-safety outcomes has increased over the last decade. However, most existing studies used a cross-sectional design. Furthermore, significant variances in nurses' work engagement and patient-safety outcomes may occur between hospitals [27]. Previous studies did not consider this phenomenon [17], which may affect the conclusions' accuracy and reliability. Based on the "Nursing Job Demands-Resource Model" and empirical evidence, the conceptual framework of this study (Figure 1) was developed.

2. Methods

2.1. Design. An 18-month prospective design was used in this study. Demographic characteristics, organizational support, leader empowerment, and core self-evaluation were collected at baseline, and work engagement and patient-safety outcomes were collected 18 months after the baseline. Data were collected from September 2021 to March 2023.

2.2. Participants. Random cluster sampling was performed to recruit nurses from 17 public hospitals in Xuzhou, China. Fifteen wards were randomly selected from each of 17 hospitals. All registered nurses of the sampled wards were invited to participate. The inclusion criteria were (i) being employed full-time; (ii) having more than one year of nursing work experience; and (iii) currently working in direct patient care roles. The PASS 2008 statistical software

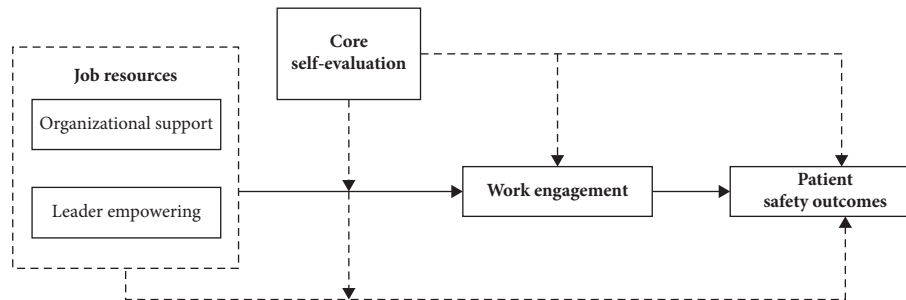


FIGURE 1: The theoretical framework of the relationship between job resources, core-evaluation, engagement, and patient-safety outcomes. A solid line indicates that the findings from the previous studies support the demonstrated relationships. A broken line indicates that no research evidence in nursing studies has demonstrated the relationships yet.

(Utah, USA) was used to calculate the sample size. A sample size of 1,067 from a population of 11,154 nurses in 17 hospitals was required based on a confidence level of 95% and a confidence interval of 3. To ensure that at least 10% of nurses in each of the hospitals participated, the target sample size was adjusted to 1,116. The final sample size of this study was 2,628, which met the minimum sample size requirement.

2.3. Data Collection. The online survey form was used to reduce response biases such as social desirability [28]. At time 1 (10 September 2021), the invitation to participate, with a link to the web-based questionnaire, was sent to eligible nurses via e-mail by the researcher. Reminder letters were sent to nonresponders 12 hours later. The same procedure was followed at time 2 (13 March 2023) by the same researcher. Only nurses who responded at time 1 were sent a time 2 survey package. At time 1, surveys were sent to 10,338 nurses and 6,234 were returned (60.3% response rate). At time 2, 2,618 nurses who responded at time 1 completed surveys (40.2% response rate).

2.4. Data Collection Tools. Web-based self-reported questionnaires were used to collect demographic characteristics, organizational support, leader empowerment, core self-evaluation, and patient-safety outcomes.

2.4.1. Organizational Support. The organizational support was measured using the Survey of Perceived Organizational Support (SPOS) [6], a 9-item single-dimension questionnaire. Participants rated items on a 7-point Likert scale ranging from 1 = “strongly disagree” to 7 = “strongly agree.” Items were added to create total scores, with increasing scores indicating higher perceptions of organizational support. SPOS is a valid and reliable instrument for Chinese nurses [29]. Cronbach’s α in this sample was 0.92.

2.4.2. Leader Empowerment. We used the Leadership Empowerment Behavior (LEB) scale to assess levels of leader empowerment [30]. The 12-item LEB scale consists of four subscales (enhancing the meaningfulness of work, fostering participation in decision-making, expressing confidence in

high performance, and providing autonomy from bureaucratic constraints). Each subscale consists of three items rated on a 5-point scale ranging from 1 = “strongly disagree” to 5 = “strongly agree,” added to create total scores. Higher overall scores suggest more leader empowerment behaviors. The LEB scale has been used by nurses with good psychometric properties [31]. Cronbach’s α in our study was 0.97.

2.4.3. Core Self-Evaluation. The Core Self-Evaluations Scale (CSES) was used to measure the core self-evaluations of nurses [32]. It consists of 12 items rated on a 5-point Likert scale (1 = “strongly disagree” to 5 = “strongly agree”). Noteworthy, six items in the CSES scale were rated in reverse order. The total score is measured by summing all items, with higher scores suggesting a better core self-evaluation. Zhang et al. have demonstrated the reliability of CSES in Chinese nurses [33]. In our study, Cronbach’s α was 0.88.

2.4.4. Work Engagement. We measured nurses’ work engagement using the Utrecht Work Engagement Scale (UWES) [2], a 17-item questionnaire comprising three subscales: vigor (six items), dedication (four items), and absorption (five items). Each item is rated on a 7-point scale (0 = “never” to 6 = “always”), with higher scores representing greater engagement. This tool has been validated and applied to Chinese nurses [34]. Cronbach’s α in this sample was 0.97.

2.4.5. Patient-Safety Outcomes. Patient-safety outcomes were measured by the Adverse Patient Events Scale (APES) [35], derived from the Nursing Quality Indicators formulated by the American Nurses Association. The APES contains six patient adverse event types: falls, pressure ulcers, healthcare-associated infections, medication errors, patient complaints, and verbal abuse. Nurses were asked to recall their experience of patient adverse events as a result of direct patient care provided by themselves over the past year. Response options ranged from 1 (never) to 7 (daily). Nurses’ assessments of patient adverse events have been utilized extensively in nursing and health care [36–38], and the APES was found to have excellent psychometric properties with Cronbach’s α of 0.93 [38]. In our study, Cronbach’s α was 0.84.

2.4.6. Demographic Variables. Sociodemographic and professional information included the age (years), gender (female, male), the highest education level (college degree or below, university degree, or above), marital status (single, married), duration of working in nursing (years), professional title (nurse, nurse practitioner, or above), and annual salary (\$).

2.5. Ethical Considerations. Institutional Review Board approval (no. KZXY-LK-20210903-026) was obtained from the researcher's hospital before commencing the study.

2.6. Strategy to Control the COVID-19 Pandemic Effects. Although the study was conducted post-COVID-19 pandemic, this crisis contingency may affect the study findings. We have taken the following measures to ensure the reliability of the results. First, all study hospitals have received unified training on the medical treatment of COVID-19 and specialized training on critical care, ensuring consistency in crisis management capabilities. Second, during the study period, there were no clusters of COVID-19 cases in the area where the study hospitals were located. Third, all study hospitals had a special ward for COVID-19 patients, and nurses from this ward were not included in this study. Fourth, we used a mixed linear model to accommodate for within-hospital correlations. In addition, the hospital hierarchy, which reflects the comprehensive strength and crisis management ability of each research hospital, was controlled in the data analysis.

2.7. Data Analysis. The first author, uninvolved in data collection and thereby unable to identify participants, conducted the entire analysis to avoid researcher bias. Data were presented as means \pm standard deviations (SDs) or n (%). Before the analysis, the histogram plot was used to determine whether the numeric variables showed a normal distribution. Next, descriptive statistics and t -tests were applied to show the distributions of demographic characteristics and the association with nurses' work engagement and patient-safety outcomes.

Because of the multilevel nested structure of the data (2618 nurses from nine different hospitals), we used a data-analysis method of mixed linear models. The dependent variables were nurses' work engagement and patient-safety outcomes at the 18-month follow-up. In Step 1, the control variables on the individual level (demographic variables that showed statistically significant in t -tests) and on the hospital level (hospital hierarchy) were entered into the regression model; in Step 2, explanatory variables (organizational support, leader empowerment, and core self-evaluation) were added; and in Step 3, the interaction effect of the explanatory variables was added. In the analysis, the hospitals were treated as random effects, and the other independent variables as fixed effects. The model fit was evaluated by degree of freedom (DF), log-likelihood (LL), and the Akaike information criterion (AIC) [39].

To explicate significant interactions, we used the Johnson–Neyman technique [40] to determine how the effect of independent variables on dependent variables varies from being significant or not based on the moderator's value. All analyses were performed using IBM SPSS (version 22.0; SPSS Inc.), with $P < 0.05$ being considered statistically significant.

3. Results

3.1. Participant Characteristics. Participants included 2,618 registered nurses recruited from 17 public hospitals. Nurses were 31.53 ± 6.98 years old with 9.69 years of nursing experience. Most were female (98.8%), and about 79% held a university degree or above. Nearly half (44.5%) of respondents had a nurse practitioner or above professional title, and only 38.3% had an annual salary of more than \$8,430.

There are statistical differences in work engagement in age, education level, marital status, work years, professional title, and annual salary (Table 1). Moreover, nurses' age, marital status, work years, and annual salary were also associated with patient-safety outcomes (all $P < 0.05$).

3.2. Longitudinal Analyses for Nurses' Work Engagement. Table 2 shows the results of longitudinal analyses for nurses' work engagement. The random effect of the variance of the hospital level was significant, indicating that nurses' work engagement varied among hospitals. In Step 1, nurses with a college degree or below ($P = 0.001$) or married ($P = 0.007$) exhibited higher levels of work engagement at the 18-month follow-up.

3.2.1. Job Resources. In Step 2, Hypothesis 1a and Hypothesis 1b were supported: greater organizational support ($\beta = 0.57$, $P < 0.001$) and leader empowerment ($\beta = 0.23$, $P < 0.001$) predicated increased work engagement when accounting for participant's age, education level, marital status, work years, professional title, salary, and hospital hierarchy. A unit improvement in organizational support was associated with an increase in work engagement score of 0.57, compared to a 0.23 increase associated with a unit improvement in leader empowerment.

3.2.2. Core Self-Evaluation. Baseline core self-evaluation ($\beta = 0.51$, $P < 0.001$) predicated 18-month work engagement when accounting for individual- and hospital-level variables (Step 2), supporting Hypothesis 1c. One unit increase in a participant's core self-evaluation score was associated with an increase in work engagement score of 0.51. Taking into account standardized effect estimates, organizational support was an outsize predictor (0.31) of nurses' work engagement, followed by core self-evaluation (0.19) and leader empowerment (0.09).

3.2.3. Joint Effects. The joint effects of core self-evaluation with organizational support ($P = 0.650$) and leader empowerment ($P = 0.310$) were insignificant; thus, the Hypothesis 1d and Hypothesis 1e were not supported. When two interaction

TABLE 1: Baseline demographic characteristic differences in response to 18-month engagement and patient-safety outcomes ($N = 2,618$).

Characteristics	N (%)	Engagement	Safety outcomes
<i>Gender</i>			
Female	2586 (98.8)	82.42 ± 22.02	8.05 ± 2.46
Male	31 (1.2)	78.55 ± 21.56	8.19 ± 2.70
<i>P</i> value		0.328	0.749
<i>Age</i>			
≤30	1327 (42.3)	81.29 ± 22.39	8.15 ± 2.51
>30	1291 (57.7)	83.52 ± 21.59	7.96 ± 2.40
<i>P</i> value		0.010	0.049
<i>Highest education level</i>			
College degree or below	552 (21.2)	84.58 ± 22.56	7.91 ± 2.43
University degree or above	2055 (78.9)	81.80 ± 21.84	8.09 ± 2.47
<i>P</i> value		0.008	0.128
<i>Marital status</i>			
Single	1913 (73.1)	80.31 ± 22.85	8.32 ± 2.68
Married	705 (26.9)	83.15 ± 21.67	7.95 ± 2.37
<i>P</i> value		0.003	0.001
<i>Work years (years)</i>			
≤10	1534 (58.6)	81.27 ± 22.08	8.14 ± 2.47
>10	1084 (41.4)	83.97 ± 21.86	7.93 ± 2.44
<i>P</i> value		0.002	0.030
<i>Professional title</i>			
Nurse	1453 (55.5)	81.43 ± 22.39	8.12 ± 2.54
Nurse practitioner or above	1165 (44.5)	83.58 ± 21.51	7.97 ± 2.35
<i>P</i> value		0.013	0.120
<i>Annual salary (\$)</i>			
≤8,430	1603 (61.2)	81.42 ± 22.54	7.90 ± 2.39
>8,430	1015 (38.8)	83.92 ± 21.12	8.29 ± 2.54
<i>P</i> value		0.005	<0.001

Note. Data are represented in n (percentage) or mean ± standard deviation.

TABLE 2: Mixed linear model analysis for predicting nurses' work engagement ($N = 2,618$).

Variables	Step 1: control variables		Step 2: explanatory variables	
	Beta (SE)	<i>P</i>	Beta (SE)	<i>P</i>
Age	0.20 (1.47)	0.889	1.06 (1.27)	0.404
Education level	-3.68 (1.11)	0.001	-2.01 (0.97)	0.038
Marital status	3.11 (1.14)	0.007	1.90 (0.99)	0.056
Work years	0.96 (1.48)	0.516	1.03 (1.28)	0.421
Professional title	1.02 (1.19)	0.390	1.02 (1.03)	0.324
Annual salary	1.38 (1.04)	0.185	0.69 (0.90)	0.442
Hospital hierarchy	0.00 (0.00) ^a	—	0.00 (0.00) ^a	—
Organizational support			0.57 (0.04)	<0.001
Leader empowerment			0.23 (0.05)	<0.001
Core self-evaluation			0.51 (0.06)	<0.001
ΔRestricted log-likelihood			735.72	
Variance of hospital level	30.84 (13.88)	0.026	22.40 (10.07)	0.026
Residual	462.59 (12.85)	<0.001	347.72 (9.67)	<0.001

Note. Beta, unstandardized effect estimate. SE, standard error. ^aThis covariance parameter is redundant and the test statistic cannot be computed.

terms were added, the model fit became worse, with the restricted log-likelihood increasing by 14.44. Therefore, no interactions were explored in the work engagement model.

3.3. Longitudinal Analyses for Patient-Safety Outcomes. Table 3 shows the results of longitudinal analyses for patient-safety outcomes. In Step 1, nurses who were married ($P = 0.005$) or made \$60,000 a year ($P = 0.008$) reported fewer patient adverse events at 18-month follow-up.

3.3.1. Job Resources. In Step 2, higher baseline organizational support predicated fewer 18-month adverse patient events when nurses' marital status, salary, and hospital hierarchy were adjusted for. When the interaction effect of leader empowerment and core self-evaluation was added (Step 3), organizational support was also significantly associated with patient-safety outcomes ($\beta = -0.02$, $P < 0.001$), supporting Hypothesis 2a. Moreover, the effect of leader empowerment on patient-safety outcomes was statistically

TABLE 3: Mixed linear model analysis for predicting patient-safety outcomes ($N = 2,618$).

Variables	Step 1: control variables		Step 2: explanatory variables		Step 3: interaction effect	
	Beta (SE)	P	Beta (SE)	P	Beta (SE)	P
Age	-0.03 (0.16)	0.875	-0.07 (0.15)	0.633	-0.06 (0.15)	0.677
Marital status	-0.35 (0.12)	0.005	-0.30 (0.12)	0.014	-0.30 (0.12)	0.012
Work years	-0.11 (0.16)	0.466	-0.11 (0.15)	0.477	-0.11 (0.15)	0.485
Annual salary	0.30 (0.11)	0.008	0.34 (0.11)	0.003	0.34 (0.11)	0.003
Hospital hierarchy	0.00 (0.00) ^a	—	0.01 (0.08)	0.904	0.01 (0.08)	0.945
Organizational support			-0.02 (0.01)	<0.001	-0.02 (0.01)	<0.001
Leader empowerment			-0.01 (0.01)	0.122	-0.07 (0.03)	0.012
Core self-evaluation			-0.03 (0.01)	<0.001	-0.10 (0.03)	0.001
Leader empowerment \times core self-evaluation					0.001 (0.001)	0.029
Δ Restricted log-likelihood			106.35		8.28	
Variance of hospital level	0.45 (0.19)	0.020	0.29 (0.16)	0.062	0.29 (0.16)	0.061
Residual	5.71 (0.16)	<0.001	5.45 (0.15)	<0.001	5.44 (0.15)	<0.001

Note. Beta, unstandardized effect estimate. SE, standard error. ^aThis covariance parameter is redundant and the test statistic cannot be computed.

significant ($\beta = -0.07$, $P = 0.012$) when the interaction between leader empowerment and core self-evaluation was adjusted for (Step 3), supporting Hypothesis 2b. One unit increase in leader empowerment score was associated with a decrease in patient adverse events score of 0.07, 3.5 times that due to a unit improvement in organizational support.

3.3.2. Core Self-Evaluation. Hypothesis 2c was supported: baseline core self-evaluation predicted 18-month patient-safety outcomes (Step 2), and this effect remained statistically significant ($\beta = -0.10$, $P = 0.001$) after controlling for the interaction effect of leader empowerment and core self-evaluation (Step 3). One unit increase in a participant's core self-evaluation score was associated with a decrease in patient adverse events score of 0.10. Taking into account standardized effect estimates, organizational support (-0.12) and core self-evaluation (-0.12) were equally crucial for patient-safety outcomes, followed by leader empowerment (-0.03).

3.3.3. Joint Effects. After Step 2, the interaction terms of core self-evaluation with organizational support and leader empowerment were entered. Although the former was not significantly related to patient-safety outcomes, the latter was; thus, the Hypothesis 2d was not supported but the Hypothesis 2e was supported. Compared with only entering the interaction term of leader empowerment and core self-evaluation, entering the interaction terms of core self-evaluation with organizational support and leader empowerment made the model fit worse, with the restricted log-likelihood increasing by 12.89. Therefore, only the interaction between leader empowerment and core self-evaluation was explored in the patient-safety outcomes model (Step 3). The joint effect of leader empowerment and core self-evaluation on patient-safety outcomes was significant ($\beta = 0.001$, $P = 0.029$). The results of the Johnson–Neyman analysis showed that the positive impact of leader empowerment on patient-safety outcomes became significant when the core self-evaluation score was <51 (Figure 2).

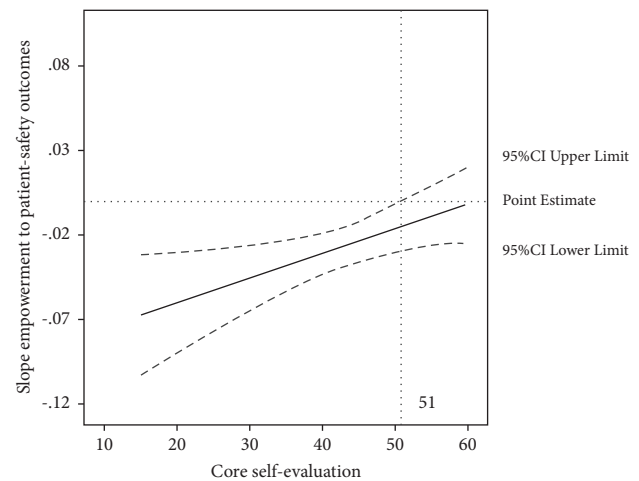


FIGURE 2: Estimated effect of leader empowerment on patient-safety outcomes moderated by core self-evaluation with Johnson–Neyman confidence bands.

4. Discussion

In this study, we clarified the effects of organizational support, leader empowerment, and core self-evaluation on nurses' work engagement and adverse patient-safety outcomes among 2,618 nurses from 17 hospitals across 18 months and examined the interaction effects. Results showed that organizational support was an outside predictor of nurses' work engagement, followed by core self-evaluation and leader empowerment. Organizational support and core self-evaluation were equally crucial for predicting patient-safety outcomes. Furthermore, the positive impact of leader empowerment on patient-safety outcomes became significant when the core self-evaluation score was below 51. These findings should enhance our understanding of the aspects of job resources and personality traits that influence nurses' work engagement and patient-safety outcomes at the hospital level.

Although research about nurses' work engagement has expanded over the decade, most published studies used cross-sectional study design. Several literature reviews identified methodological weaknesses and suggested that further research is required to decipher the antecedents of work engagement in nursing practice [17]. Our results are similar to previous findings on the positive effects of organizational support on engagement [7]. The material resources, fair rewards, and emotional encouragement from the hospital can boost the intrinsic interest of nurses in their work tasks [41]. There have been conflicting data on the impact of leader empowerment on engagement. In most quantitative studies, leader empowerment is positively associated with work engagement [10, 11]; however, some nurses reported negative perceptions of leader empowerment because communication around change initiatives was unclear and lacked feedback [42]. Our results supported that a higher level of leader empowerment leads to better work engagement in nurses. Therefore, effective communication and timely feedback for clinical nurses are essential for maintaining an empowering environment to ensure the engaged staff. Moreover, this study indicates that core self-evaluation is an independent predictor of nurses' work engagement. Several studies have demonstrated that a strong sense of self-efficacy (often described as a component of core self-evaluation) can help nurses continue to engage in clinical practice when they experience job stress and problems [7, 43]. Important information about the role of core self-evaluation in explaining work engagement among nurses needs to be included, as earlier studies almost focused on job satisfaction [44]. Work engagement has a stronger predictive value than job satisfaction since the former is closely related to nurses' care quality, patient outcomes, and institutional costs [1]. Regarding the contribution to the Nursing JD-R model [17], the present study added a new predictor-core self-evaluation. We also confirmed that leader empowerment is less strongly a predictor of work engagement than organizational support and core self-evaluation.

This study extended the finding of job resources and personality traits to outcomes other than nurses' work engagement, as we also focus on patient-safety outcomes. We found that organizational support positively affected patient-safety outcomes, which is consistent with results in existing studies [45]. Our finding suggested that adequate organizational support could improve work engagement in nurses and eventually decrease adverse patient-safety outcomes. Previous studies proved that nurses are more likely to be engaged in their work and provide high-quality care when the institutional structure and system support the care process [7, 46]. Another significant finding of our study pertains to the interaction effect of leader empowerment and core self-evaluation on patient-safety outcomes. More specifically, the benefits of high leader empowerment for fewer adverse patient events were only apparent in the context of low nurses' core self-evaluation. The possible explanation relates to the effect of leader empowerment on bridging the estrangement between leaders and employees caused by administrative hierarchy. A review noted that professional hierarchies in healthcare could increase the

chance of communication failures and potentially harm patient safety [47]. According to the core self-evaluation theory [48], core self-evaluation affects employees' thinking processes and specific appraisals of job resources. Our results indicated that nurses with lower levels of core self-evaluation had a more substantial need for leader empowerment.

4.1. Limitations. Although our study applied longitudinal design and controlled confounding variables in the mixed linear regression model, it has several limitations. First, this study should be cautiously generalized since the participants were recruited from one geographic region. The use of a convenient sample of 13 hospitals and a response rate of 60% at baseline and 40% at the 2nd time point might suggest self-selection bias, thus threatening the external validity of this study. Additional studies should be conducted in other healthcare systems with more diverse participants. Another limitation is that nurses reported patient-safety outcomes. Although nurses' assessments of patient adverse events have been utilized extensively in nursing and health care and the measures have been proven to be valid and reliable, the reliability of the results might be compromised. Future studies should collect patient adverse event data from accurate records. Third, in order to gather longitudinal data, we did not utilize anonymous questionnaires, which might lead to social desirability responses. Despite we employed different researchers for data collection and analysis, the data remained susceptible to self-reporting bias. Lastly, while multiple strategies were used to reduce the impact of the COVID-19 pandemic on the study findings, we did not directly measure the crisis management ability of study hospitals, which may undermine the credibility of the results.

5. Relevance to Clinical Practice

The results of this study indicate that nurses' work engagement is mainly predicted by organizational support. Organizational-level interventions, encompassing theory- and evidence-based practices, should be available to nurses. Given that core self-evaluation is a personality trait that predicts both work engagement and patient-safety outcomes, it may be valuable to assess the baseline attributes of the candidates and commit to ongoing training to develop positive core self-evaluation attributes. Moreover, periodic assessments of nurses' work engagement, from the perspective of staff nurses, nurse leaders, physicians, and patients, may identify solid areas and those needing improvement relative to patient-safety outcomes. Lastly, the effect of leader empowerment should be emphasized, especially when staff nurse has a low level of core self-evaluation. Helping nurse leaders develop positive empowerment practices can be a potential strategy to enhance nurses' work engagement and prevent adverse patient events. Existing literature demonstrated practical empowerment skills for nurse leaders, including giving public praise, modeling behaviors, communication skills, and coaching abilities [49].

6. Conclusion

Organizational support, leader empowerment, and core self-evaluation significantly influenced nurses' work engagement and patient-safety outcomes. Although knowledge about the relevance of nurses' work engagement is accumulating, the present study confirmed the causality of relationships between the variables by longitudinal follow-up. We hope this study can provide evidence-based guidance for hospital managers to improve the engagement of nurses. Moreover, given the interaction effect of core self-evaluation and leader empowerment on patient-safety outcomes, empowerment training for nurse leaders should be an essential component of further interventions aiming to improve patient-safety outcomes when nurses have low core self-evaluation.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Knowledge and Training Needs in Nosocomial Infection among Hospital Staff in the City of Kielce, Poland: A Cross-Sectional Study

Kamila Fortunka ¹, **Agnieszka Strzelecka**,² **Grzegorz Król** ¹, **Paulina Paprocka**,¹
Angelika Mańkowska,¹ **Agata Lesiak** ¹, **Urszula Karpeta**,¹ **Sławomir Okła**,^{3,4}
Jakub Spalek,^{3,4} **Szczepan Kaliniak**,⁴ **Ewelina Piktel** ⁵, **Maciej Karasiński**,⁵
Bonita Durnaś,¹ and **Robert Bucki** ^{1,5}

¹Department of Microbiology and Immunology, Institute of Medical Science, Collegium Medicum, Jan Kochanowski University of Kielce, IX Wieków Kielc 19A, 25-317, Kielce, Poland

²Institute of Health Science, Collegium Medicum, Jan Kochanowski University of Kielce, IX Wieków Kielc 19A, 25-317, Kielce, Poland

³Institute of Medical Science, Collegium Medicum, Jan Kochanowski University of Kielce, IX Wieków Kielc 19A, 25-317, Kielce, Poland

⁴Department of Otolaryngology, Head and Neck Surgery, Holy-Cross Cancer Center, Artwińskiego 3, 25-734, Kielce, Poland

⁵Department of Medical Microbiology and Nanobiomedical Engineering, Medical University of Białystok, Jana Kilińskiego 1, 15-089, Białystok, Poland

Correspondence should be addressed to Robert Bucki; buckirobert@gmail.com

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Introduction. Nosocomial infections are an integral part of health care services, posing a threat to both patients and medical staff. The duty and role of nursing staff is to prevent nosocomial infections in every hospitalized person. **Material and Methodology.** The study involved 635 nurses working in various surgical and conservative wards. The technique used was the author's questionnaire, which contained 30 questions and was divided into three components. **Results.** The level of knowledge among the surveyed nurses was at a sufficient level for more than half of the total tested population, and its level was influenced by two variables: the specialization held and the level of education. Nurses working in medical wards have a higher level of knowledge in the area of basic concepts related to nosocomial infections, and people who use specialist medical literature and participate in specialist courses have a sufficient level of knowledge. The shortest time since the last training results in a higher level of knowledge and a higher level of knowledge in the area covering the basic concepts of nosocomial infections. The most frequently selected issues on which nurses would like to expand their knowledge were post-exposure procedures and methods of monitoring nosocomial infections. **Conclusions.** The knowledge of the nursing staff in the field of nosocomial infections is diverse, and its main determinants are specialization, education, and age. A sufficient level of knowledge among the respondents is conditioned primarily by the use of specialist literature and participation in specialist courses, which determine both the scope and area of knowledge on nosocomial infections.

1. Introduction

Nosocomial infections are a challenging problem in modern medicine, occurring as adverse events in connection with the provision of health services [1]. They are a therapeutic

encounter, an epidemiological problem, but also an economic problem due to the high costs mostly associated with prolonged stays of patients in hospitals [2]. The hospital environment is a favorable place for the occurrence and spread of infections both in the group of patients and

medical staff [3]. The literature on the subject emphasizes the long-known fact that nosocomial infections are an inseparable part of the treatment process, while the hands of the staff are the most important vector of transmission of microorganisms in the group of hospitalized patients. Already in the 1990s, the Centers for Disease Control and Prevention (CDC) showed that proper hand hygiene is the most effective, simplest, and, at the same time, cheapest way to prevent nosocomial infections [4]. Nosocomial infections may occur among patients treated both in conservative and surgical wards [5]. Frequently, nosocomial infections undermine the results of treatment for the underlying disease and prolong the period of hospitalization for the patient, thus creating a risk of losing their job and adversely affecting their mental health. Nosocomial infections can also lead to the death of the patient, which may result in serious legal consequences [6]. The effects of nosocomial infections affect not only the individual patient but also the entire society by affecting the cost of health premiums [7].

Reducing the frequency of nosocomial infections is a complex process, depending on several key elements: knowledge of nosocomial infections, knowledge of procedures and their observance, proper hospital hygiene, which translates into proper interruption of pathogen transmission, as well as properly applied rules of asepsis, which is crucial in preventing infections in people who underwent surgical procedures [8]. These activities are labour-intensive, tedious, and oblige us to constantly recreate the correct patterns of preventive behavior [9]. Medical personnel should have optimal qualifications, both theoretical and practical, regarding the procedures performed [10]. The largest professional group in hospitals, and at the same time the one that has the most frequent contact with patients, is the nursing staff. Therefore, they are required to take a responsible attitude at every stage of patient care, i.e., during the diagnosis of the disease, treatment planning, as well as the entire diagnostic and therapeutic process. Hygiene, asepsis, antisepsis, and work organization procedures functioning in hospitals must be very well known and performed with due diligence. Nurses' knowledge of nosocomial infections and adherence to procedures while performing nursing activities is an overriding factor that must translate into conduct in their daily work [11, 12].

Many studies indicate that there are significant gaps between scientific knowledge in the field of nosocomial infections and its practical implementation in everyday hospital practice. Another problem is the failure to comply with procedures that prevent nosocomial infections, which leads to the health risks of both hospitalized patients and medical personnel [13]. Nursing staff should have extensive knowledge of nosocomial infections, especially in the field of prophylaxis, and knowledge and competences should be constantly consolidated, updated, and based on scientific evidence [14]. Education focusing only on the transfer of theoretical knowledge is not very effective and insufficient to change behavior. Prevention and control of nosocomial infections is most effective with a multimodal strategy [15]. Indeed, a multimodal strategy to improve hand hygiene

compliance was initially approved and released by WHO in 2009. The approach uses educational tools and programs, supervision and control, active staff participation, and leadership commitment to infection control [16].

In order to acquire the appropriate skills for the prevention and control of nosocomial infections, nursing staff must undergo appropriate education and training that combine theory with clinical practice. Healthcare facilities must ensure that education correlates with the current needs of the nursing staff. Nursing staff should have time set aside for training and educational events and should be supported by their employers in applying their knowledge in practice. Internal training should be carried out by qualified persons with medical education, experts in the field of nosocomial infections, and nurses who understand the problems and needs of nurses in this area [14].

1.1. The Aim of Study. The main objective of the study was to assess the state of knowledge and education needs of nursing staff on nosocomial infections among nurses working in hospitals in the city of Kielce.

2. Materials and Methods

2.1. Variables and Their Pointers. The independent variables and their indicators were socio-demographic factors, i.e., gender (female, male), age (under 30, 31 to 39, 40 to 49, over 50), education (medical secondary school, medical vocational, higher professional bachelor of nursing, vocation master's degree in nursing), work experience (up to 10 years, from 10 to 20 years, over 20 years), specialization (yes or no), and place of work (non- or surgical ward). The dependent variable in the conducted study was the knowledge of the nursing staff about nosocomial infections, while the indicator for the adopted variable was the respondents' answers to the questions included in the questionnaire. The ranges for the variables were selected based on the analysis of similar studies on this topic.

2.2. Population and Sample of the Study. The number of nursing staff in the Świętokrzyskie Voivodeship is 5,290 people. There are 20 hospitals in the entire province. These are 1st, 2nd, and 3rd degree hospitals, oncology and pulmonology hospitals, and nationwide hospitals. There are five hospitals in the city of Kielce. Two first-level hospitals: Kielce Hospital of St. Aleksandra -Limited Liability Company and Świętokrzyskie Center for Mother and Newborn -Specialist Hospital in Kielce. One tertiary hospital is the Provincial Combined Hospital in Kielce. There is also one state hospital: the Independent Public Health Care Center of the Ministry of Interior and Administration in Kielce, and one oncology hospital: the Świętokrzyskie Oncology Center. The list of all hospitals and the number of nurses in the city of Kielce was prepared on the basis of data from the National Health Fund. The list of all hospitals in the Świętokrzyskie Voivodeship was prepared on the basis of data from the National Health Fund.

The research was carried out in all hospitals in the city of Kielce, except the Świętokrzyskie Center for Mother and Newborn - Specialist Hospital in Kielce, because mainly midwives work in this hospital. Among all medical staff working in hospitals, the focus was exclusively on nurses because nursing staff have the most frequent contact with patients and play a key role in the prevention of nosocomial infections.

Participation in the study was offered to all nurses who worked in the hospitals participating in the study. When selecting the sample for the study, the sample size calculator of the statistical program STATISTICA version for Windows 13.1 TIBCO Software Inc. was used. – StatSoft, Poland, with a 95% confidence interval. This made the sample representative. Based on data on the number of people working in the city of Kielce, the minimum group of nursing staff that should be included in the study was 311 people.

2.3. Research Methods and Tools. In order to achieve the goal set in the planned study, the diagnostic survey method was used. The survey questionnaire was developed based on the analysis of many similar studies, in which the researchers also used their own questionnaires to assess the knowledge of medical staff. Most research works on this problem are based on proprietary surveys, and such a survey was also used in the presented study [17–19].

The technique used was the author's questionnaire, which contained 30 questions and was divided into three components. The first part contained 6 questions and concerned sociodemographic data; the second part included 20 questions related to issues testing knowledge about nosocomial infections, while the last part included 4 questions concerning training in acquiring knowledge about nosocomial infections.

The tool prepared in this way was validated. Validations were carried out before the actual examination on a group of 294 nurses. Cronbach's alpha was 0.751, which proves the reliability of the tool - a self-designed questionnaire, which included questions on the state of knowledge in the field of nosocomial infections.

2.4. Data Collection Method. Based on data on the number of nurses working in the city of Kielce, the minimum number of respondents that should be included in the study was determined to be 311 people, but ultimately a larger research group of 635 people was studied. This resulted in the surveyed sample being representative. The surveys were distributed and collected from March to September 2022, and the questionnaire was distributed to various departments by the authors.

2.4.1. Data Analysis. While examining the state of knowledge and the need for education of the nursing staff on nosocomial infections, 20 statements were identified that determined its overall indicator. The answers given by the respondent were required to be classified as correct or incorrect. Each correct answer was assigned a value of 1, and

0 points for an incorrect answer. Then, the points were summed up, and the maximum number of possible scores was 20.

The statistical methods used in the work depended on the types of variables analyzed. For qualitative variables, i.e., gender, type of department, specialization, age, education, or work experience, the distribution (n) and frequency (%) are given, and to verify the independence of variables determining the level and state of knowledge, the χ^2 test was used, or, in the case of a small number, the least numerous classes ($n < 5$) χ^2 test based on maximum likelihood functions (NW). The χ^2 independence test is based on the comparison of observed and expected numbers (the expected numbers are determined assuming that the null hypothesis is true). For quantitative variables (raw values of the level of knowledge), location measures are provided: median (Me), lower quartile (Q1), and upper quartile (Q3), and the lowest (min) and highest (max) values of the examined parameter are indicated.

Searching for an answer to the research problem, how the level of knowledge regarding hospital infections develops (numerical values - raw indicator) depending on selected sociodemographic parameters or the type of ward (medical or surgical), differences in the distribution of the examined parameter were verified using the nonparametric *Mann-Whitney U test* (when comparing two independent groups) or using the *Kruskal-Wallis ANOVA* rank test (when comparing more than two independent groups). Subsequently, if the null hypothesis was rejected in favor of an alternative hypothesis for these tests (statistic value of a given test $p < \alpha$ for more than two independent groups), multiple comparisons of the mean ranks for all samples (post hoc) were performed to determine a pair of variables for which the distribution of the examined parameter was statistically significantly different. *Spearman's rho* correlation analysis was used to determine the relationship between ordinal variables (qualitative variables) and raw numerical values between the studied variables. Logistic regression analysis was used to determine the predictors influencing the level and sources of the respondents' knowledge and participation in specialized courses. The construction of the model was preceded by a preliminary selection of predictors by assessing their quality using Crammer's V coefficient. At this stage, some of the predictors were rejected, and then the sequential construction of the logistic regression model began. For this purpose, forward stepwise regression was used, and the significance of the difference between subsequent sequentially built models was assessed using the LR test (likelihood ratio). The goodness of fit of the model was verified using the Hosmer-Lemeshow test. Then, an ROC curve was constructed for the same pairs of variables, which was used to assess the compliance of the studied factors resulting from the model with the actual indications. The area under the ROC curve was calculated, denoted as AUC (area under curve), which is a measure of the goodness of the model. The Youden Index was used to determine the cut-off point for raw numerical values and to determine the sufficient level of knowledge of respondents regarding nosocomial infections.

The selected significance level of $\alpha = 0.05$ was adopted in the work. The data was collected in an Excel spreadsheet belonging to the MS Office package by Microsoft. Statistical analysis was performed in STATISTICA version for Windows 13.1 TIBCO Software Inc. – StatSoft, Poland. Data are presented in the form of tables and figures.

2.4.2. Characteristics of the Study Group. Among the respondents, the majority were women (94.00%), aged up to 30 years (32.30%), and had master's degrees (58.40%). More than half of the respondents had no specialization (60.00%), their work experience was up to 10 years (43.50%), and a larger number of nursing staff worked in surgical departments (55.00%) (Table 1).

3. Results

3.1. Sociodemographic Factors Affecting the Level of Knowledge among the Respondents. By examining the state of knowledge and the need for education of nursing staff on nosocomial infections, 20 statements were identified in three thematic areas that determined its overall index. The first area covered the basic concepts of nosocomial infections and consisted of 6 factors. The second area concerned issues in the field of infection/microbiology with particular emphasis on microbiological diagnostics, and also included 6 factors. The third and last area concerned the methods of preventing nosocomial infections and included 8 elements that influenced the assessment of the state of knowledge.

The answers given by the respondents had to be classified as correct or incorrect. Each correct answer was assigned a value of 1, and 0 for an incorrect answer. Then, the points were summed up, and the maximum number of possible points received was 20. In this approach, only correctly given answers were assessed and interpreted, which allowed for a good differentiating power of the respondents into groups with a different level of knowledge in the discussed area.

Subsequently, it was determined to what extent sex, age, education, specialization, and work experience affect the level of knowledge of nurses regarding nosocomial infections.

Comparisons of raw numerical values were made for selected sociodemographic variables. It was found that the level of knowledge about nosocomial infections was affected by the specialization, education level, and age of the surveyed nurses (Table 2).

On the basis of the raw numerical results, the general index of knowledge of the subjects regarding nosocomial infections was normalized. For this purpose, a dichotomous variable (0, 1) was created, where 0 means an insufficient level of knowledge and 1 means a sufficient level of knowledge.

The standardized qualitative variable defined in this way allowed us to conclude that the insufficient level of knowledge was present in 216 (34.02%) and sufficient in 419 (65.98%) of the examined nurses (Figure 1).

TABLE 1: Detailed characteristics of the study group of nurses.

Sociodemographic data		n	%
Sex	Woman	597	94.00
	Man	38	6.00
Age	Up to 30 years	205	32.30
	From 31 to 39 years	138	21.70
	From 40 to 49 years	142	22.40
	Over 50 years old	150	23.60
Education	Medical highschool	49	7.70
	Medical professional study	49	7.70
	Higher professional (bachelor of nursing)	166	26.10
	Higher master's nursing	371	58.40
Specialization	Yes	255	40.00
	No	380	60.00
Seniority	Up to 10 years	276	43.50
	From 10 to 20 years	126	19.80
	Over 20 years old	233	36.70
Branch type	Conservative	285	45.00
	Treatment	350	55.00

To define the state of knowledge among the surveyed nurses, the Youden Index was used (AUC = 0.537, CL 95% 0.438–0.636). The cut-off point obtained for the study group, resulting from raw scores is 14 points out of 20 possible (which is 70.00% of correct answers) (Figure 2).

The assessment of knowledge in the field of nosocomial infections (a dependent variable in the logistic regression model) was defined as a dichotomous variable with two variants: sufficient [1] and insufficient (0). The construction of the model was based on forward-step regression, and the significance of the difference between successive, sequentially built models was assessed using the LR test (likelihood ratio).

Based on the estimated logistic regression, it can be concluded that the chance of having higher knowledge in the field of nosocomial infections is 1.5 times higher among nurses with specialization (OR = 1,489; 95% CI: 1,050–2,112; $p = 0.026$) than among respondents who do not have additional competences. Another determinant is the level of education - the chance of having sufficient knowledge about nosocomial infections decreases when the respondents graduate from medical high school (OR = 0.415; 95% CI: 0.294–0.998; $p = 0.004$) and medical vocational studies (OR = 0.532; 95% CI: 0.294–0.998, $p = 0.049$). In the case of respondents with vocational education (Bachelor of Nursing), the level of knowledge is at a similar level compared to people with higher education (Table 3).

The value of the Hosmer–Lemeshow statistic is 2,442, with a value of $p = 0.295$, which proves a significant fit of the logistic regression model. Based on the analysis of the area under the ROC curve, it can also be concluded that the model is moderately fit to the data (area is AUC = 0.605) (Figure 3) and has a moderate predictive power resulting from the obtained plots of sensitivity and specificity (specificity) for various levels probabilities.

TABLE 2: The level of knowledge of the respondents (raw numerical values) due to selected sociodemographic factors and the type of ward as a place of work.

Variables	<i>n</i>	Me	Q1	Q3	Min	Max	<i>p</i> value
Generally	635	15	3	20	13	16	—
Woman	597	15	13	16	3	20	0.437 ^A
Man	38	14	12	16	5	18	
Conservative	285	15	13	17	6	20	0.016 ^{A*}
Treatment	350	15	12	16	3	19	
No specialization	380	14	12	16	3	19	0.001 ^{A*}
Having a specialization	255	15	13	17	4	20	
Age up to 30 years	205	14	13	16	5	20	0.026 ^{B*}
Age from 31 to 39 years	138	15	13	16	4	19	
Age from 40 to 49 years	142	15	13	17	4	19	
Age over 50	150	14	12	16	3	20	
Medical highschool	49	13	11	15	4	18	0.004 ^{B*}
Medical professional study	49	14	12	16	8	19	
Higher professional (bachelor of nursing)	166	14	12	16	3	19	
Higher Master's nursing	371	15	13	16	4	20	
Work experience -up to 10 years	276	15	13	16	5	20	0.434 ^B
Work experience -from 10 to 20 years	126	15	13	16	3	19	
Work experience -over 20 years	233	14	12	17	4	20	

^AMann-Whitney *U* test, ^BKruskal-Wallis rank ANOVA test, **p* < α , α = 0.05.

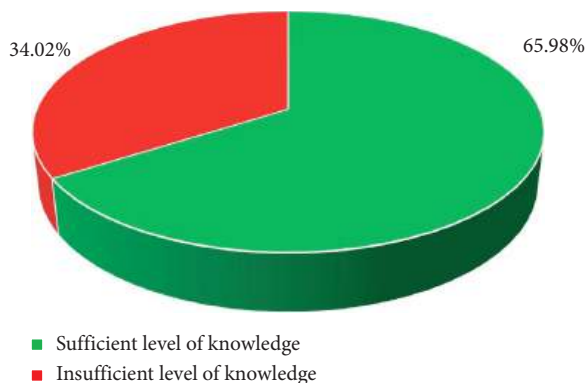


FIGURE 1: The level of knowledge of the surveyed nurses regarding nosocomial infections normalized results.

3.2. Sources of Knowledge Affecting the Level of Knowledge among the Respondents. The level of knowledge among the respondents is affected by such factors as the level of education or having additional competences in the field of specialization. Factors that can also modify (differentiate) it include internal training in the workplace, scientific conferences, specialist courses, webinars and online training, specialized medical literature, and media such as television, the Internet, and nonmedical press.

Using logistic regression, it was determined which sources had the greatest impact on the level of knowledge of the respondents (dichotomous variable) regarding hospital infections. For this purpose, forward stepwise regression was used in accordance with the procedure described when creating the model in the previous section.

Based on the estimated logistic regression, it can be concluded that the chance of having sufficient knowledge in the field of nosocomial infections is 1.6 times higher among

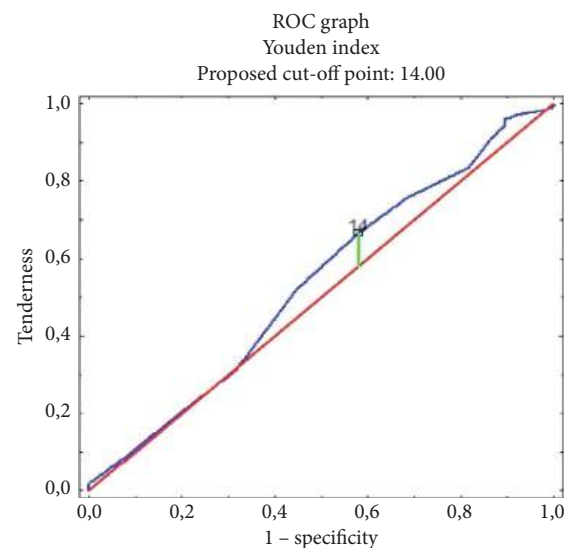


FIGURE 2: Youden index for the raw indicator of knowledge in the field of nosocomial infections in the group of surveyed nurses.

nurses who use specialist medical literature (OR = 1,612; 95% CI: 1,068–2,432; *p* = 0.023) and take part in specialist courses (OR = 1,613; 95% CI: 1,007–2,581; *p* = 0.047). This type of extension (supplementation) of professional competences determines a higher standardized knowledge index (Table 4).

The value of the Hosmer-Lemeshow statistic is 1,172, with a *p* value = 0.556, which proves a significant fit of the logistic regression model. Based on the analysis of the area under the ROC curve, the model is also moderately fit to the data (area is AUC = 0.572) (Figure 4) and has a moderate predictive power, resulting from the obtained plots of sensitivity and specificity for different levels of probability.

TABLE 3: Predictors affecting the level of knowledge of the surveyed nurses in the field of nosocomial infections.

Variable -reference variant	Estimation of the logistic regression parameter	OR (95% CI)	<i>p</i> value
Free expression	0.717	2.048 (1.568–2.676)	0.001
Education: medical high school	-0.888	0.415 (0.294–0.998)	0.004
Education: medical vocational studies	-0.613	0.532 (0.294–0.998)	0.049
Education: higher professional (bachelor of nursing)	-0.308	0.735 (0.497–1.087)	0.123
Having a specialization	0.398	1.489 (1.050–2.112)	0.026

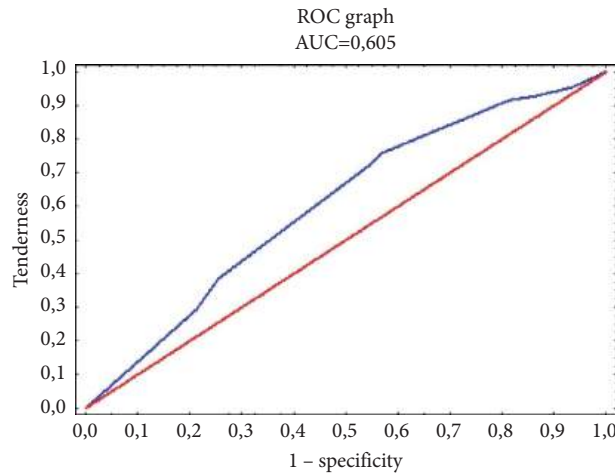


FIGURE 3: The ROC curve plot for the logistic regression model is moderately fitted to the predictors, i.e., education and specialization possessed, affecting the level of knowledge of the surveyed nurses in the field of nosocomial infections.

TABLE 4: Sources affecting the level of knowledge of the surveyed nurses in the field of nosocomial infections.

Variable -reference variant	Estimation of the logistic regression parameter	OR (95% CI)	<i>p</i> value
Free expression	0.472	1.603 (1.320–1.948)	0.001
Specialized medical literature	0.477	1.612 (1.068–2.432)	0.023
Specialized courses	0.478	1.613 (1.007–2.581)	0.047

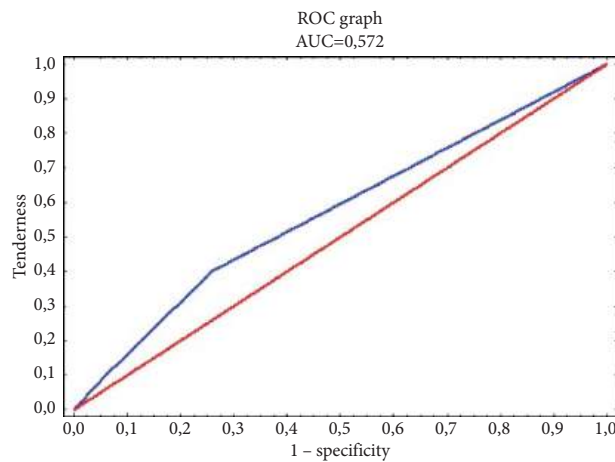


FIGURE 4: The plot of the ROC curve for the logistic regression model is moderately matched to the sources, i.e., specialist medical literature and specialist courses affecting the level of knowledge of the surveyed nurses in the field of nosocomial infections.

3.3. Time since the Last Training and the Level of Knowledge among the Respondents. Participation in training is an important factor influencing the level of knowledge in the field of nosocomial infections. Searching for a relationship between the time that has elapsed since the last training and the state of knowledge in the field of nosocomial infections in the respondents, the variable defining the condition in question was coded in the form of ranks. The highest rank of "5" was defined as the longest time since the last training—three years and more, "4" more than two years ago, "3" two years ago, "2" a year since the last training, and "1" was assigned for the shortest time—in current year.

Using correlation analysis (Spearman's rho), a relationship was sought between time and general knowledge and its individual areas (raw numerical index) regarding hospital infections. A statistically significant relationship was found: the higher the index of general knowledge ($r = -0.080$; $p = 0.044$) and knowledge for area I ($r = -0.081$; $p = 0.041$), the shorter the time since the last training. The subjective assessment of the respondents' own knowledge also increases ($r = -0.183$; $p = 0.001$) (Table 5).

3.4. Areas of Knowledge Affecting the Increase of Competences among the Respondents. Raising professional competence is an important factor influencing the level of knowledge about nosocomial infections. New technologies and solutions force the need for continuous improvement. The respondents indicated the areas of training and courses covering issues in terms of the possibility of infections in hospital wards, including: hand hygiene, use of personal protective equipment; disinfection and sterilization; postexposure procedure; preventing nosocomial infections by properly performing nursing procedures, i.e., caring for a patient with a urinary catheter, central catheter, changing dressings, toileting a bedridden patient; ways to monitor nosocomial infections; development of epidemic outbreaks, and the principles of rational antibiotic therapy.

The need to increase competence in the field of nosocomial infections was determined using logistic regression predictors. The dependent variable in the model was the willingness to participate in specialist courses and was defined as a dichotomous variable with two variants: yes (1) and no (0). The construction of the model was based on forward step regression, and the significance of the difference between successive, sequentially built models was assessed using the LR test (likelihood ratio).

The scope of content affecting the increase in competences has been presented in the form of a model in the table below (Table 6).

Based on the estimated logistic regression, it can be concluded that people declaring the improvement of their knowledge on nosocomial infections in the form of specialist courses will more often indicate the need to improve qualifications in the area of postexposure management (OR = 3,245; 95% CI: 2,096–5,025; $p = 0.001$) and monitoring nosocomial infections (OR = 1,906; 95% CI: 1,215–2,990; $p = 0.005$) compared to those who did not indicate this form of improvement (Table 6).

The value of the Hosmer–Lemeshow statistic is 5,750, with the value $p = 0.452$, which indicates a significant model of fit of the logistic regression model. Based on the analysis of the area under the ROC curve, it can also be concluded that the model is well fitted to the data (area area is AUC = 0.684) (Figure 5) and has good predictive power resulting from the obtained sensitivity and specificity plots for different levels of probability.

3.5. General State of Knowledge of the Respondents in the Field of Nosocomial Infections. By checking the state of current knowledge of the nursing staff on nosocomial infections, three thematic areas were defined: the basic concepts of nosocomial infections; the microbiology of infections, including issues related to microbiological diagnostics; and ways to prevent nosocomial infections.

The knowledge of the nursing staff regarding nosocomial infections was checked using a standardized index. The general level of knowledge did not turn out to be statistically significantly differentiated by the type of ward ($p = 0.993$). However, it should be noted that an insufficient level of knowledge was found in every third respondent from the conservative and surgical ward (97; 34.04% vs 119; 34.00%). In the case of area, I concerning basic concepts in the field of nosocomial infections, a statistically significantly higher level of knowledge was found in people working in medical wards ($p = 0.031$). The level of knowledge for area II, microbiology of infections, including issues related to microbiological diagnostics ($p = 0.069$) and for area III, methods of preventing nosocomial infections ($p = 0.625$), turned out to be at a similar level, where only every second person surveyed was at the level of sufficient. Existing deficiencies in the professional competences of nurses and male nurses were found (Table 7).

The first area covered the basic concepts of nosocomial infections, which consisted of 6 statements covering the following issues: definition of nosocomial infection, system of preventing and combating nosocomial infections, clinical forms of nosocomial infections, definition of endo- and exogenous infections, antibiotic therapy, and selected ways of preventing nosocomial infections (procedures after-exposure).

Statistically significantly more often ($p = 0.001$) the correct definition of nosocomial infection was indicated by the respondents from medical wards (228; 80.00% vs 240; 68.57%). They defined nosocomial infection as any infection that was not in the incubation phase at the time of admission to the hospital, and symptoms occurred 48–72 hours after admission to the hospital or after discharge from the hospital within a period not longer than the longest incubation period. Every fifth person (57; 20.00%) working in conservative wards and every third (110; 31.43%) in surgical wards incorrectly defined nosocomial infection, defining it most often as any infection that was found during the patient's hospital stay and was caused by multidrug-resistant microorganisms present in the hospital environment.

TABLE 5: Relationship between the time since the last training and particular dimensions of knowledge about nosocomial infections.

Time since last training a:	Spearman's rho	$t(N-2)$	p value
Raw indicator of general knowledge	-0.080	-2.017	0.044*
Raw knowledge index: area I	-0.081	-2.049	0.041*
Raw knowledge index: area II	-0.052	-1.316	0.188
Raw knowledge index: area III	-0.039	-0.977	0.329
Subjective assessment of the state of knowledge	-0.183	-4.673	0.001*

* $p < \alpha$; $\alpha = 0.05$ a statistically significant relationship was found.

TABLE 6: Predictors affecting the level of knowledge of the surveyed nurses in the field of nosocomial infections.

Variable -reference variant	Estimation of the logistic regression parameter	OR (95% CI)	p value
Free expression	-2.022	0.132 (0.099-0.177)	0.001
Postexposure procedures	1.177	3.245 (2.096-5.025)	0.001
Methods of monitoring nosocomial infections	0.645	1.906 (1.215-2.990)	0.005

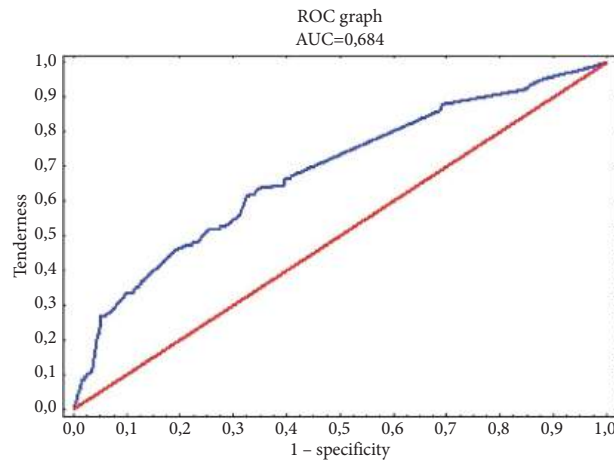


FIGURE 5: The plot of the ROC curve for the logistic regression model is moderately fitted to the predictors, i.e., postexposure management and methods of monitoring nosocomial infections, affecting the level of knowledge of the surveyed nurses in the field of nosocomial infections.

TABLE 7: The general state of knowledge of the surveyed nurses in the field of nosocomial infections.

Area	Together ($n = 635$; %)	Conservation ward ($n = 285$; %)	Treatment department ($n = 350$; %)	p value*
General knowledge about nosocomial infections				
Sufficient	419 (65.98)	188 (65.96)	231 (66.00)	0.993
Insufficient	216 (34.02)	97 (34.04)	119 (34.00)	
Area I: basic concepts of nosocomial infections				0.031**
Sufficient	376 (59.21)	182 (63.86)	194 (55.43)	
Insufficient	259 (40.79)	103 (36.14)	156 (44.57)	
Area II: microbiology of infections, including issues related to microbiological diagnostics				0.069
Sufficient	280 (44.09)	137 (48.07)	143 (40.86)	
Insufficient	355 (55.91)	148 (51.93)	207 (59.14)	
Area III: ways to prevent nosocomial infections				0.625
Sufficient	292 (45.98)	128 (44.91)	164 (46.86)	
Insufficient	343 (54.02)	157 (55.09)	186 (53.14)	

The asterisks indicate as follows: *Test χ^2 , ** $p < \alpha$; $\alpha = 0.05$ statistical significance was found.

Statistically significantly more often ($p = 0.001$) the respondents from medical wards (278; 97.54% vs 315; 90.00%) correctly defined the procedure for implementing and ensuring the functioning of the system for preventing and combating nosocomial infections as mandatory for

all hospitals, imposed by law. The most frequently selected incorrect answer was the statement that the procedure in question is obligatory for clinical, specialist, and provincial hospitals, and voluntary for powiat hospitals.

Every second person, both working in conservative and surgical wards ($p = 0.206$), was able to correctly determine that the most common form of clinical nosocomial infection is urinary tract infection (152; 53.33% vs 169; 48.29%). The incorrect answer indicated by the subjects in both groups was that it is pneumonia. It was found that the respondents did not have sufficient competence (knowledge) in the discussed area.

The correct definition that endogenous infections are caused by microorganisms from the patient's own physiological flora (natural microbiota) was more often indicated by the respondents working in conservative wards than in surgical wards (207; 72.63% vs 231; 66.00%), but this difference turned out to be statistically insignificant ($p = 0.067$). Every third respondent incorrectly indicated the source of these infections, pointing to the environment of a given hospital/patient's surroundings.

The next area covered knowledge in the field of antibiotic therapy and the determination of therapy, which consists in selecting the drug in accordance with the identification of the pathogen and determining its drug susceptibility. The vast majority of respondents answered the question correctly, pointing to targeted therapy (269; 94.39% vs 326; 93.14%, $p = 0.521$). Combination therapy was the incorrectly chosen answer.

According to the respondents, the potential source of HBV, HVC and HIV infection is blood and any biological material containing blood and semen, pre-ejaculate, and vaginal discharge. This is the correct answer, which was indicated equally often ($p = 0.383$) by the respondents from the conservative and surgical wards (251; 88.07% vs 300; 85.71%). Incorrect answers included statements that only blood and any biological material containing blood are such a source (Table 8).

The second area (6 items) focused on the microbiology/infections, taking into account issues in the field of microbiological diagnostics and etiological factors of nosocomial infections.

The respondents indicated *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa* as the most common etiological factor of nosocomial infections for the entire hospital, where statistically significantly more often ($p = 0.048$) correct indications were found in people working in medical wards (218; 76.49% vs 243; 69.43%). The most frequently indicated incorrect answer was that this agent is *Streptococcus pyogenes*, *Klebsiella pneumoniae*, and *Acinetobacter baumannii*.

According to the respondents, the microorganism that most often contributes to the occurrence of hospital diarrhea in adults is *Clostridioides difficile*. The frequency of correct indications in both study groups (247; 86.67% vs. 291; 83.14%) was statistically insignificantly differentiated ($p = 0.220$). The most common incorrect answer in the discussed area was the indication of *Escherichia coli* EPEC (enteropathogenic strains of *Escherichia coli*).

According to the respondents, the most common ways of transmission of *Staphylococcus aureus* in the hospital environment are the hands of medical personnel (202; 70.88% vs 236; 67.43%, $p = 0.350$). Unfortunately, every third

respondent could not correctly indicate the routes of its transmission, pointing to surgical tools. The hands of nursing staff play an important role in the transmission of microorganisms and thus contribute to the spread of nosocomial infections.

If sepsis is suspected in a patient with a central venous line, blood should be collected from the central line and 2 separate peripheral lines for microbiological testing. This procedure was indicated only by every second respondent (131; 45.96% vs 172; 49.14%, $p = 0.425$). The others pointed to an incorrect operation taking blood from a central venous line and one peripheral venous line. This allows for the conclusion that knowledge in the discussed area is insufficient.

The time after which the result of a microbiological urine test with an antibiogram is obtained is 2-3 days. Statistically significantly more often ($p = 0.032$) the correct answer was indicated by the staff from conservative wards (206; 72.28% vs 225; 64.29%). The most common incorrect answer was the term waiting time after one week.

The last element in the field of microbiology of infections and microbiological diagnostics covered strains that are classified as alarm factors. The vast majority of respondents correctly identified methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus faecium* (VRE), and *Escherichia coli* producing ESBL beta-lactamase (223; 78.25% vs 265; 75.71%, $p = 0.452$). The erroneous indication was to select only one strain: methicillin-resistant *Staphylococcus aureus* (MRSA) (Table 9).

The third area, i.e., the last one, covered various ways to prevent nosocomial infections and contained 8 questions.

In the case of the question regarding perioperative antibiotic prophylaxis, the correct answer is that it is a short (usually one dose) administration of an antibiotic (usually cefazolin) just before the procedure in a contaminated clean field or a clean field with a high risk of infection. This was statistically significantly more often ($p = 0.028$) given by nurses and nurses working in surgical wards (99; 28.29% vs 59; 20.70%). Every 7th respondent incorrectly indicated the answer as a short (usually one dose) administration of an antibiotic (usually cefazolin) just before each surgical procedure.

According to the respondents, the correct management of a patient in whom the *Klebsiella pneumoniae* NDM strain was detected in a rectal swab taken at admission to the hospital as part of screening tests is to isolate the patient until the end of the hospital stay in a separate room or cohort with patients who have been diagnosed with the same microorganism; therefore, antibiotic therapy should not be implemented. The frequency of correct indications in both study groups (106; 37.19% vs 108; 30.88%) was statistically insignificantly differentiated ($p = 0.093$). The most frequently incorrectly indicated answer was treatment of the patient with an antibiotic in accordance with the antibiogram and isolation or cohort until the end of antibiotic therapy. Appropriate management of a patient diagnosed with the *Klebsiella pneumoniae* NDM strain is important due to the fact that this bacterium is resistant to most available antibiotics and spreads very easily in the hospital environment.

TABLE 8: Area I: basic concepts of nosocomial infections.

Components of the area I/type of response	Together (n = 635; %)	Conservation ward (n = 285; %)	Treatment department (n = 350; %)	p value*
A nosocomial infection is considered to be any infection that was not in the incubation phase at the time of admission to the hospital, and the symptoms appeared 48–72 hours after admission to the hospital or after discharge from the hospital within a period not longer than the longest incubation period				
Correct	468 (73.70)	228 (80.00)	240 (68.57)	0.001**
Incorrect	167 (26.30)	57 (20.00)	110 (31.43)	
The implementation and operation of a system for preventing and combating nosocomial infections is mandatory for all hospitals, imposed by law				
Correct	593 (93.39)	278 (97.54)	315 (90.00)	0.001**
Incorrect	42 (6.61)	7 (2.46)	35 (10.00)	
The most common clinical form of nosocomial infections is urinary tract infection				
Correct	321 (50.55)	152 (53.33)	169 (48.29)	0.206
Incorrect	314 (49.45)	133 (46.67)	181 (51.71)	
Endogenous infections are caused by microorganisms from the patient's own physiological flora (natural microbiota)				
Correct	438 (68.98)	207 (72.63)	231 (66.00)	0.072
Incorrect	197 (31.02)	78 (27.37)	119 (34.00)	
The use of an antibiotic selected on the basis of an antibiogram is a targeted therapy				
Correct	595 (93.70)	269 (94.39)	326 (93.14)	0.521
Incorrect	40 (6.30)	16 (5.61)	24 (6.86)	
A potential source of infection with HBV, HCV and HIV viruses is blood and any biological material containing blood and semen, pre-ejaculation, and vaginal secretion				
Correct	551 (86.77)	251 (88.07)	300 (85.71)	0.383
Incorrect	84 (13.23)	34 (11.93)	50 (14.29)	

*Test χ^2 ; **p < α ; $\alpha = 0.05$ statistical significance was found.

TABLE 9: Area II: microbiology of infections, including issues related to microbiological diagnostics.

Components of area II/type of response	Together (n = 635; %)	Conservation ward (n = 285; %)	Treatment department (n = 350; %)	p value*
Microorganisms that are the most common etiological agents of nosocomial infections (generally for the entire hospital) are <i>Staphylococcus aureus</i> , <i>Escherichia coli</i> , <i>Pseudomonas aeruginosa</i>				
Correct	461 (72.60)	218 (76.49)	243 (69.43)	0.048**
Incorrect	174 (27.40)	67 (23.51)	107 (30.57)	
The microorganism that is the most common cause of nosocomial diarrhea in adults is <i>Clostridioides difficile</i>				
Correct	538 (84.72)	247 (86.67)	291 (83.14)	0.220
Incorrect	97 (15.28)	38 (13.33)	59 (16.86)	
Nosocomial staphylococcal infections are most often transmitted by the hands of medical personnel				
Correct	438 (68.98)	202 (70.88)	236 (67.43)	0.350
Incorrect	197 (31.02)	83 (29.12)	114 (32.57)	
If sepsis is suspected in a patient with a central venous line, blood should be collected from the central line and 2 separate peripheral lines for microbiological testing				
Correct	303 (47.72)	131 (45.96)	172 (49.14)	0.425
Incorrect	332 (52.28)	154 (54.04)	178 (50.88)	
The result of a microbiological urine test with an antibiogram is obtained after 2-3 days				
Correct	431 (67.87)	206 (72.28)	225 (64.29)	0.032**
Incorrect	204 (32.13)	79 (27.72)	125 (35.71)	
The alarming agents (microorganisms) are methicillin-resistant <i>Staphylococcus aureus</i> (MRSA), <i>Escherichia coli</i> producing ESBL beta-lactamase, and vancomycin-resistant <i>Enterococcus faecium</i> (VRE)				
Correct	488 (76.85)	223 (78.25)	265 (75.71)	0.452
Incorrect	147 (23.15)	62 (21.75)	85 (24.29)	

*Test χ^2 ; **p < α ; $\alpha = 0.05$ statistical significance was found.

With the exception of contact with patients infected with *Clostridioides difficile*, the recommended method of hand hygiene during nursing procedures is hand disinfection using an alcohol-based hand rub. The vast majority of respondents correctly indicated this answer (207; 72.63% vs 256; 73.14%). The most frequently and incorrectly chosen

answer was that if the hands are visually clean, then only hand disinfection using an alcohol-based agent, and washing and subsequent disinfection only when the hands are dirty.

When asked when nonsterile disposable gloves should be used, the correct answer was that during contact with body fluids, excretions, and secretions of the patient and during all

activities with an isolated patient who is colonized/infected with an alert microorganism, this ($p = 0.376$) was indicated by the subjects from the conservative and surgical wards (232; 81.40% vs 275; 78.57%). Incorrectly, the most common response was to use nonsterile disposable gloves only when in contact with body fluids, excretions, and secretions of the patient.

Statistically significantly more often ($p = 0.014$) the respondents from the medical wards (176; 61.75% vs 182; 52.00%) correctly identified the personal protective equipment that should be provided to the nursing staff performing activities with a patient covered by air-dust isolation (gloves, protective apron, filtering half-mask). The most frequently selected incorrect answer was gloves, a protective gown, and surgical mask.

Containers intended for medical waste with sharp ends or edges should be replaced when filled to a maximum of 2/3 of the volume, but at least once every 2-3 days. This answer was correctly indicated by the majority of respondents (235; 82.48% vs 287; 82.00%, $p = 0.881$). The incorrectly selected answer was to replace the containers after filling up to 2/3 of their volume, regardless of the time of their use.

When asked how long an alcohol agent should remain on the skin in order to properly disinfect the patient's skin before taking blood for laboratory tests, the nursing staff correctly answered that until it dries or according to the manufacturer's information on the preparation's packaging (228; 80.00% vs 292; 83.43%, $p = 0.264$). The most frequently incorrectly indicated answer was about 10 seconds.

The last question in this area concerned the correct procedure after a needle stick that had previously been used for intravenous injection. The skin should be washed with plenty of lukewarm water and soap, do not squeeze the wound; do not stop bleeding; do not use alcohol-based disinfectants immediately after a cut or puncture; put on a sterile dressing; and report the case of occupational exposure in the workplace. This answer was indicated as correct by the majority of respondents in both groups (267; 93.68% vs. 317; 90.57%). The most frequently incorrectly indicated answer was to stop bleeding immediately after a cut or needle stick, not to use alcohol-based disinfectants, to apply a sterile dressing, and to report a case of occupational exposure in the workplace (Table 10).

4. Discussion

Healthcare-associated infections are a global problem and a major threat to the safety, health, and lives of patients [20]. Reducing the number of nosocomial infections is possible thanks to rigorous adherence to medical procedures as well as consolidating and updating the knowledge of medical staff in the fields of epidemiology, etiology, transmission routes, and, above all, methods of infection prevention. One of the most effective procedures to prevent the spread of infection, both in hospitals and in everyday life is hand hygiene [21]. However, despite the fact that it is a simple procedure, the theoretical and practical knowledge among medical personnel, including nursing staff, is not always satisfactory. Therefore, topics related to hand hygiene should be

a permanent part of health education, not only for medical personnel but also for patients [22]. The importance of education as an important element of infection prevention is emphasized in many studies. The problem should be approached multidimensionally, and the increasing frequency of infections among hospitalized patients must be accompanied by increasing the awareness of medical staff and continuous training in this area [23]. The obtained research results can be easily transferred to the entire region of Poland due to the fact that Kielce is the capital of the Świętokrzyskie Voivodeship, where there are representative hospitals from every level of reference, which can undoubtedly be applied to other centers such as Łódź or Warsaw.

4.1. Sociodemographic Factors. The study showed that the level of knowledge about nosocomial infections is influenced by the education, specialization, and age of the surveyed nurses. Similar results were obtained by the authors of a study conducted in Zhejiang Province, China, in which doctors and nurses working in neonatal intensive care units took part, and the subject of the study was their knowledge and attitudes in the field of prevention and control of nosocomial infections caused by multidrug-resistant organisms. The knowledge of the surveyed people was correlated with gender, education, referral status of the hospital, and additionally with regular supervision and training [24]. A study conducted among nurses in India also showed a statistically significant relationship between infection control knowledge, seniority, and the place of work of nurses [25]. On the other hand, Turkish research, which assessed the impact of various factors on the level of knowledge in the field of hand hygiene before and after the training, did not show a statistically significant effect of seniority on the knowledge of this issue but showed a statistically significant relationship between the increase in knowledge after the training and variables such as marital status, gender, and type of ward [26]. In an interesting study conducted among nonmedical staff from various hospitals in Iran, a statistically significant correlation was obtained between seniority, type of hospital, and knowledge and attitudes regarding the control of nosocomial infections [27]. The work of authors from Uganda, evaluating the knowledge of representatives of various medical professions about the resistance of microorganisms to antibiotics and rational antibiotic therapy, revealed statistically significant differences between knowledge and practice. Nurses had lower knowledge compared to doctors and pharmacists [28]. Another study from India provided knowledge that statistically significant elements that influenced the state of knowledge among nursing staff about the so-called universal precautions are as follows: gender, place of residence, and education [29]. The impact of similar factors (gender, age, and type of employment) on the knowledge of health professionals in the field of healthcare-associated infections was shown by subsequent studies by Chinese authors. In addition, it was shown that people who participated in clinical consultations with infectious disease doctors had greater knowledge [30].

TABLE 10: Area III: ways to prevent nosocomial infections.

Components of area III/type of response	Together ($n = 635$; %)	Conservation ward ($n = 285$; %)	Treatment department ($n = 350$; %)	p value*
Perioperative antibiotic prophylaxis is a short (usually 1 dose) administration of an antibiotic (usually cefazolin) just before surgery in a contaminated clean or clean field with a high risk of infection				
Correct	158 (24.88)	59 (20.70)	99 (28.29)	0.028**
Incorrect	477 (75.12)	226 (79.30)	251 (71.71)	
Proper management of a patient who has a <i>Klebsiella pneumoniae</i> NDM strain detected in a rectal swab taken at hospital admission as part of screening is to isolate the patient until the end of the hospital stay in a separate room or cohort with patients with the same microorganism detected therefore, antibiotic therapy should be implemented				
Correct	214 (33.70)	106 (37.19)	108 (30.88)	0.093
Incorrect	421 (66.30)	179 (62.81)	242 (69.14)	
With the exception of contact with patients infected with <i>Clostridioides difficile</i> , the recommended method of hand decontamination during nursing procedures is hand disinfection using an alcohol-based hand rub				
Correct	463 (72.91)	207 (72.63)	256 (73.14)	0.885
Incorrect	172 (27.09)	78 (27.37)	94 (26.86)	
Nonsterile disposable gloves are used during contact with body fluids, excretions, and secretions of the patient and during all activities with an isolated patient who is colonized/infected with the alarm agent (microorganism)				
Correct	507 (79.84)	232 (81.40)	275 (78.57)	0.376
Incorrect	128 (20.16)	53 (18.60)	75 (21.43)	
When performing activities with a patient remaining in air-dust isolation, the nursing staff should be equipped with the following personal protective equipment: Gloves, protective apron, and filtering half-mask				
Correct	358 (56.38)	176 (61.75)	182 (52.00)	0.014**
Incorrect	277 (43.62)	109 (38.25)	168 (48.00)	
Containers intended for medical waste with sharp ends or edges should be replaced when filled to a maximum of 2/3 of the volume, but at least once every 2-3 days				
Correct	522 (82.20)	235 (82.48)	287 (82.00)	0.881
Incorrect	113 (17.80)	50 (17.54)	63 (18.00)	
In order to properly disinfect the patient's skin before taking blood for laboratory tests, the alcohol agent should remain on the skin until it dries or according to the manufacturer's information on the preparation's packaging				
Correct	520 (81.89)	228 (80.00)	292 (83.43)	0.264
Incorrect	115 (18.11)	57 (20.00)	58 (16.57)	
The correct procedure after a needle injury, which was previously used for intravenous injection, is to wash the skin with plenty of lukewarm water and soap, do not squeeze the wound, do not stop bleeding, do not use alcohol-based disinfectants immediately after a cut or puncture, put on a sterile dressing, report a case of occupational exposure in the workplace				
Correct	584 (91.97)	267 (93.68)	317 (90.57)	0.151
Incorrect	51 (8.03)	18 (6.32)	33 (9.43)	

*Test χ^2 ; ** $p < \alpha$; $\alpha = 0.05$ statistical significance was found.

A study in the United Kingdom assessing knowledge of recommendations for the prevention of methicillin-resistant *Staphylococcus aureus* (MRSA) infection showed the influence of medical specialty on knowledge in this area. In the knowledge-testing survey, the best results were obtained by people specializing in anesthesiology and intensive care, while the weakest people with diagnostic specializations, i.e., radiology, biochemistry, or laboratory medicine. In addition, it was found that the results of epidemiological nurses [8, 31] were higher than those of physicians (8.69 and 6.6 points out of 1, respectively) [32]. Researchers from Ethiopia have shown that although education and professional experience have an impact on medical workers' theoretical knowledge in the field of infections, this knowledge does not translate into appropriate practice. Continuous on- and off-work training and continuous updating of medical procedures related to infection prevention can fill this gap [19].

4.2. Sources of Knowledge. The sources of knowledge that had an impact on the sufficient level of knowledge among the respondents were specialist medical literature and specialist

courses, and the most frequently indicated source of knowledge were internal trainings conducted in the workplace. In Italy, the sources of knowledge indicated by the respondents in the prevention of SSI were guidelines in this area (73.60%) and similar training courses (51.60%) [33]. In Pakistan, the nursing staff mainly gained knowledge from doctors (72.30%), and the other sources of knowledge were training and the Internet (6.90%) [34].

4.3. Time since Last Training. A statistically significant relationship was also found: the shorter the time since the last training, the higher the level of knowledge among nursing staff. Researchers from other countries have reached the same conclusions. In Turkey, nurses who received training in hygienic hand washing increased their knowledge in this area. All nurses had a statistically significantly higher level of knowledge than before the training, and the percentage of correct answers exceeded 90.00% [26]. A study conducted in India on the knowledge, attitudes, and practices of nursing staff in the field of infection control also showed that after the training intervention, knowledge among staff increased

from 9.42 to 12.98 one week after the training, and after a month, it was still high and amounted to 12.18. In addition, it resulted in a reduction in the incidence of urinary tract infections and intravascular catheter-related infections [35]. The same data were provided by a study in Switzerland, where knowledge after a training intervention increased, especially among nurses and medical staff who did not perform managerial functions [36]. In Spain, nurses' knowledge of venous line recommendations also improved with 4 out of 14 instructions following a training program [37]. In a comparative study among Ethiopian and Chinese nurses, more Chinese nurses received training (54.40%) compared to Ethiopian nurses (41.70%). Among Chinese nurses, the vast majority reported regular supervision, monitoring, and monthly training on the prevention of nosocomial infections compared to Ethiopia, where hospitals conducted regular educational programs, but only for new employees [38]. A study in Poland provided other conclusions. The time that has passed since the last training did not significantly affect the level of knowledge, which was at a comparable level among the surveyed nursing staff, while participation in training on nosocomial infections resulted in a higher level of knowledge among the respondents [39]. Kong et al., in their study, checked the knowledge of medical workers about nosocomial infections and hand hygiene in endoscopy rooms before and after the introduction of the PDCA method, which is a modus operandi of continuous improvement. The results confirmed that the knowledge of the surveyed people was statistically significantly higher than in the control group [40]. To sum up, it can be noted that participation in training is a very important factor influencing the level of knowledge among medical staff.

4.4. Areas of Knowledge. In this study, nursing staff had the highest knowledge of basic concepts regarding nosocomial infections (59.21%). Similarly, in Italy, the area in which the level of knowledge was the highest was general issues regarding nosocomial infections [41], while in Iran, most respondents (90.90%) demonstrated the highest knowledge in the field of hand hygiene and medical waste management [27]. Similarly, in the United States, the highest knowledge among nurses was reported in issues related to hand hygiene and handling sharps instruments [42].

4.5. State of Knowledge. Many researchers point out that properly educated and trained nursing staff who follow all prevention rules, such as hand hygiene or isolation, significantly reduce hospital infections. Many studies have also confirmed that it is impossible to replace qualified nursing staff. In intensive care units, when there is an insufficient number of nursing staff or when nurses do not have sufficient knowledge about the prevention and control of nosocomial infections, this significantly increases the incidence of nosocomial infections, complications, and patient deaths. Index SENIC (Study of the Efficacy of Nosocomial Infection Control) found that hospitals reduced nosocomial infections by approximately 32% when their infection

surveillance and control program included four components, two of which involved skilled and knowledgeable staff: at least one full-time infection control specialist for every 250 beds and a trained hospital epidemiologist [43]. Other researchers have also proven the relationship between education and knowledge and the occurrence of nosocomial infections. Urinary tract infections decreased by 9% among patients cared for by nurses with higher education and, therefore, greater knowledge; the same correlation occurred in patients with pneumonia, where this percentage decreased by 6%. Other research conducted by Cho et al. also confirmed this correlation that skilled nurses reducing patients' incidence of pneumonia by 10% [44]. Also, Needleman et al. came to the same conclusions. The association between qualified staff was associated with a shorter hospital stay and a lower incidence of nosocomial urinary tract infections and upper gastrointestinal bleeding. In addition, urinary tract infections decreased among surgical patients [45]. Olatade et al. found a statistically significant relationship between knowledge and their preventive practice against nosocomial infections among health care workers, which is consistent with appropriate expectations [46].

In the study, the general knowledge of nurses and male nurses regarding nosocomial infections was at a sufficient level for the majority of respondents (65.98%). Other data were provided by a Polish study conducted among nursing staff, whose level of knowledge on postexposure prophylaxis and contact-transmitted infections was insufficient [39]. Meanwhile, a sufficient level of knowledge has also been obtained by scientists in other countries. In India, the knowledge of hand hygiene among medical staff was $66.4\% \pm 27.5\%$ [47] and the awareness of nursing staff was 69.25%. The general state of knowledge about nosocomial infections was at a very good level (above 70.00%) [29]. In Pakistan, 65.56% of respondents had adequate knowledge of nosocomial infections [23], while in another study also conducted in the same country, the average result of knowledge was higher and amounted to 79.94 ± 20.67 , and 56.00% of nursing staff had good knowledge [34]. High results were also obtained by researchers in Italy, checking the knowledge of nurses in the prevention and control of nosocomial infections. Among the respondents, 75.80% of people had a sufficient level of knowledge [48]. A similar level of knowledge was obtained by nonmedical staff working in hospitals in Iran in the field of nosocomial infection control. The vast majority of staff (75.00%) had adequate knowledge, and the mean score was 11.2 ± 2.2 (range: 3–15) [27]. Very high results were obtained in the study by Tash et al. where the level of knowledge about hand hygiene practices and the use of personal protective equipment among nurses was as high as 94.40% (85/90) [49]. Nurses in Kosovo had similarly high knowledge; the general level of knowledge on the spread of nosocomial infections was 90.00% [50]. In the United States, nurses also had a good knowledge of nosocomial infection control [42]. In Nepal, however, the level of knowledge was much lower; only 57.10% of the nursing staff had the appropriate knowledge, and the average of the ratings was 27.75 out of 38 [51]. Equally low

knowledge was found in African countries, i.e., Ethiopia, where only 45.50% of nurses had sufficiently good knowledge on the prevention of nosocomial infections [52]. A similar study in Cyprus showed that nurses do not have sufficient knowledge about nosocomial infections in geriatric patients [53]. The same data was provided by another study conducted in Poland. The nursing staff did not have sufficient knowledge about urinary tract infections. The highest scores were obtained by respondents with basic knowledge of urinary tract infections [54]. In Bulgaria, knowledge about the prevention and control of nosocomial infections exists among healthcare professionals but is at a very basic level. Nurses derive their knowledge from their daily work in the hospital [55]. In Australia, the knowledge of nurses has also not reached a high level. The median assessment of ICU staff knowledge of VAP was 6/10 (IQR: 5–7) [56]. In South Korea, the level of hand hygiene knowledge among nursing staff was also low [57]. A low level of knowledge about CRBSI was also found among Jordanian ICU nurses. The average knowledge score was 3.3, and SD was 1.8 (out of 10) [58].

The study showed that the level of knowledge is statistically significantly different and higher in the group of staff working in conservative wards compared to surgical wards, and the median in both groups was 15. Different results were obtained in a study in Italy among nurses working in surgical wards. The nursing staff in surgical wards had a higher level of sufficient knowledge (78.60%) compared to nurses from other wards (73.60%) [48]. Another study conducted in Italy found a similar relationship. Knowledge among the respondents was higher in the people who work in intensive care units [59]. A study in Pakistan also showed that people working in gynecology and surgery, i.e., surgical departments, had higher knowledge than people working in other departments [34]. In Poland, however, the type of ward did not have a statistically significant effect on the general level of knowledge of medical personnel about contact-transmitted infections [60].

In our study, when asked about the correct duration of skin disinfection in a patient before collecting blood for laboratory tests, the respondents correctly indicated that the alcoholic agent should dry or in accordance with the manufacturer's recommendations on the preparation's packaging (81.89%). In Pakistan, the correct duration of hand washing was indicated by fewer staff (73.70%) [61]. A similar study was conducted in Germany, assessing the knowledge and behavior of nurses and nursing managers regarding hand hygiene in nursing homes. The respondents obtained comparable results (79.00%) in the field of effective hand hygiene methods, answering that 30 seconds is the correct time for hand disinfection [62]. In India, significantly fewer people (54.00%) [47] answered the same question correctly. In another study in India, the respondents' knowledge about the appropriate duration of hygienic and surgical hand washing and the sequence of removing personal protective equipment was at a similar level and amounted to 60.00–70.00% [29].

In our study, nursing staff, when asked about the choice of the recommended method of hand decontamination while performing nursing procedures, except for contacts with patients infected with *Clostridioides difficile*, respondents correctly indicated that it was hand disinfection using an alcohol-based agent (72.91%). Yanke et al. in their study focusing on the prevention of *Clostridioides difficile* infections indicated that some employees wrongly believed that alcohol-based hand sanitizer was an effective method of decontaminating hands after leaving the room of a patient infected with this anaerobic bacterium [63]. In Italy, much fewer respondents (28.50%) knew that washing hands with soap and water was the right way to prevent the spread of nosocomial infections with this bacterium [64].

In our study, when asked what most often causes hospital staphylococcal infection, nursing staff indicated that it is in the hands of medical staff (68.98%). In India, when asked about the main route of spread of microorganisms among patients in health facilities, more respondents (88.00%) answered correctly that it is the contaminated hands of medical staff and indicated the hospital environment as the most common source of pathogens responsible for infections associated with the provision of health services (40.9%) [47]. Nurses working in Kuwait (73.60%) [65] and Saudi Arabia (77.80%) also showed higher knowledge in this area, indicating the same answer [66]. Nurses working in Kuwait (68.50%) were able to identify 5 moments of hand hygiene [65], and medical students in Slovakia (67.10%) had sufficient knowledge of observing hand hygiene rules [21]. An interesting study was also conducted among medical and nursing students in Greece, where future nurses (60.40%) had higher knowledge than future doctors (57.20%) about hand hygiene [67]. In Greece, during qualitative interviews, medical staff admitted that they did not have sufficient knowledge, especially regarding hand hygiene, wrongly believing that its main purpose was solely to protect staff [68]. Among Dutch nursing staff, the majority of people stated that they had knowledge of "how to work hygienically" and how to explain to patients the purpose of preventing and controlling nosocomial infections [69]. In the United States, only 45.40% of nurses indicated that they always wash their hands before inserting a urinary catheter [31]. In Italy, the vast majority of respondents (91.00%) believed that they always performed hand antiseptics, both before and after invasive procedures, such as catheterization of the urinary bladder or insertion of a cannula into a peripheral vein [33].

When asking the respondents when to use nonsterile disposable gloves, they most often answered that during contact with the patient's body fluids, excretions, and secretions and when performing all activities with an isolated patient who is colonized with an alarm factor (79.84%). A study in India on hand hygiene knowledge, attitudes, and practices found that respondents were less knowledgeable. The study showed that 59.00% of staff believed that wearing gloves could replace hand washing or disinfection [70]. The same view was held among Dutch nurses in a study conducted by Lescure et al. [71]. In the United States, health care workers interviewed reported that they always wear gloves as

part of standard precautions. In addition, most employees declared that they use gloves in situations where they are not necessary and always perform hand hygiene before putting on gloves [72].

In our study, the majority of nursing staff (91.97%) knew the correct procedure for following a needle stick injury that had previously been administered intravenously. Medical staff in Nepal showed higher knowledge (98.80%), indicating that large amounts of lukewarm water and soap should be used after an incidental injury with a sharp medical instrument [51]. In turn, staff in India had lower knowledge in this area, where 78.00% of respondents [47] and 50.00% of nurses knew what to do in the event of a needle stick injury [73].

When examining the knowledge of nursing staff regarding the time after which sharp-edged medical waste containers should be replaced, our respondents answered that after they were filled to a maximum of 2/3 of their volume, but at least once every 2-3 days (82.20%). Respondents in India showed lower knowledge (70.00%) in the proper management of acute medical waste [29], as well as in Nepal, where only half of the respondents believed that an appropriate system and supervision of medical waste are factors influencing the prevention of infections hospital [51]. In Italy, however, nurses indicated that 21.00% of containers intended for medical waste were filled to more than ¾ of their capacity, both in surgical and medical wards [48].

When asked about the potential sources of HBV, HCV, and HIV infection, our respondents answered that it was blood and any biological material containing blood, as well as semen, pre-ejaculate, and vaginal secretions (86.77%). Health care workers in Georgia [74] had an insufficient level of knowledge regarding the above issue, and in Nigeria, the general knowledge of the subject and postexposure procedures among respondents was very low [75].

When asked about the personal protective equipment that medical personnel should be equipped with in the case of air-dust isolation, our respondents answered that they should have gloves, a protective apron, and a filtering half-mask (56.38%). In Spain, more nurses (90.00%) knew that they should wear a mask and protective glasses when suctioning secretions from the trachea [76]. In Nepal, most nurses reported wearing gloves, a mask, and goggles to protect themselves from blood and body fluids [51]. In Jordan, most respondents had knowledge about isolation precautions, but questions about air and contact isolation were the most difficult, and fewer respondents knew the correct answer (40.70%) [77]. In Nigeria, only 8.00% of staff were able to name the types of isolation, and 17.80% believed that personal protective equipment was necessary for isolation. Also, a small number of people (14.50%) were able to name situations in which such isolation is necessary [78]. In Italy, the vast majority of respondents (93.20%) claimed to use disposable protective equipment on patients with infectious diseases [33].

When asked about the use of antibiotics based on the antibiogram, respondents indicated that it was a targeted therapy (93.70%). A similar study was conducted in the

United States, where fewer nurses (64.20%) were familiar with the terms antibiotics and antimicrobial stewardship [79], and in the study by Greendyke et al., a similar number of staff (62.00%) did not have sufficient knowledge [80]. The issue of antibiotic resistance also caused great difficulty among respondents in Saudi Arabia; only 29.10% of nurses knew the correct definition [81]. In Singapore, as many as 38.60% of nurses admitted that they had no or limited knowledge of antimicrobial management [82].

The nursing staff had a good knowledge of alarm microorganisms that are resistant to one or more classes of antibiotics (76.85%). In the Netherlands, fewer nurses felt they had sufficient knowledge about MDROs and were able to provide answers to patients in this area. The average knowledge score was 4.5 (range 0–10), and 2/3 of the respondents would like to increase their knowledge on this topic [69]. In Greece, among the nursing staff working in the ICU, during the interview, few respondents reported information about infections that develop there, and no nurse mentioned the colonization and spread of MDROs [83].

Nurses had a big problem with giving the correct answer regarding perioperative antibiotic prophylaxis. Only 24.88% of respondents knew that one dose of cefazolin should be administered just before the procedure in a clean contaminated field or in a clean field with a high risk of infection. In Italy, even fewer staff (14.10%) knew the correct duration of antibiotic prophylaxis (<24 hours after surgery) in their department [33].

4.6. Limitations of the Study. A limitation of the study in terms of assessing the differences between the sexes may be the small number of men (only 6%) among the respondents. This is due to the fact that the vast majority of nurses are women. The study may also be limited by the time interval between the beginning of the study and its completion, reflecting the time between the distribution of the questionnaires and their return by the respondents. This may raise doubts as to the independence of the answers provided by the respondents. This fact could affect the credibility of the obtained results. Another weakness of the study is the lack of a test validation of the instrument; only the Cronbach's alpha coefficient was used, which indicated that the tested questionnaire is a reliable and a valid tool. The analysis confirmed its reliability in terms of basic psychometric properties. Reliability is demonstrated by high values of Cronbach's alpha coefficient. All questions and statements included in the questionnaires were understandable to the respondents. As a process, validation involves collecting and analyzing data to assess the accuracy of an instrument. There are numerous statistical tests and measures to assess the validity of quantitative instruments, which generally involve pilot testing. Another limitation is the lack of a pilot test of the instrument which should be carried out on a small number of people in order to verify whether the selected methods, techniques, and tools are appropriate for the studied group.

5. Implications for Nursing Management

Nosocomial infections are an integral part of the provision of health services, so it is important to know how to minimize the risk of infections. Particular attention should be paid to the continuous, frequent, and regular training of nurses in the field of nosocomial infections, because the knowledge of nursing staff is insufficient. The acquired specialized knowledge must be translated into the everyday preventive behaviors of nurses and also try to supervise and verify nurses' behavior. Knowledge must be followed by specific preventive behaviors. It is advisable to develop procedures and research tools in the health care system that would be helpful both in assessing and acquiring knowledge about nosocomial infections.

6. Conclusions

The level of knowledge about nosocomial infections among nursing staff is insufficient. Knowledge is diverse, and its main determinants are specialization, education and age. A sufficient level of knowledge among the respondents is conditioned primarily by the use of specialist literature and participation in specialist courses, which determine both the scope and area of knowledge about nosocomial infections. Nursing staff working in conservative wards are characterized by a higher level of knowledge in the area of basic concepts related to nosocomial infections. The area of knowledge that will be strengthened is the microbiology of infections, including issues related to microbiological diagnostics. Postexposure management and methods of monitoring nosocomial infections are the areas in which the respondents most often would like to deepen their knowledge.

Data Availability

The data used in this study will be available upon request.

Disclosure

The article was based on the doctoral dissertation: "Assessment of the state of knowledge and need to educate nursing staff about nosocomial infections".

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Knowledge, Attitude, and Practice (KAP) of ICU Nurses towards Tracheal Intubation Patients' Postextubation Dysphagia: A Cross-Sectional Study

Shanshan Sun,¹ Lei Tao,¹ Lin Yang,² and Zhigang Zhang¹ 

¹Department of Critical Care Medicine, The First Hospital of Lanzhou University, School of Nursing, Lanzhou University, Lanzhou, Gansu 730000, China

²Sias University, Zhengzhou, Henan 450000, China

Correspondence should be addressed to Zhigang Zhang; zzg3444@163.com

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Aim. The aim of this study was to understand the current status of knowledge-attitude-practice of ICU nurses in tertiary care hospitals regarding swallowing disorders after extubation of tracheally intubated patients and to analyse the influencing factors. **Design.** A cross-sectional study. **Background.** Most patients admitted to the ICU have an endotracheal tube, which may be the cause of acute and/or chronic problems after extubation. Therefore, training of ICU nurses and early extubation are essential to prevent these problems. **Methods.** A convenience sample of clinical nurses ($n = 627$) was selected from Grade A Hospitals in Northwest, North, and Central China as the study population. Survey instruments included the Questionnaire on ICU Nurses' Knowledge, Attitude, and Practice of Postextubation Swallowing Disorders in Patients with Tracheal Intubation. **Data Sources.** Data were sourced from structured questionnaire responses. **Results.** A total of 647 ICU nurses participated in this survey, with 627 valid questionnaires. The three dimensions of knowledge, attitude, practice, and the total score of the questionnaire on ICU nurses' knowledge, attitude, and practice of postextubation swallowing disorders in patients with tracheal intubation were (6.46 ± 3.09), (7.53 ± 1.69), (4.89 ± 2.00), and (18.88 ± 5.18), respectively. Multiple linear regression analysis showed that the factors affecting the total score of PED among ICU nurses were age, nationality, professional title, job satisfaction, and mode of employment. Gender, age, nationality, and job satisfaction were the factors that influenced the score of knowledge. The influencing factors of attitude score include gender, age, nationality, section, professional title, job satisfaction, and mode of employment. The influencing factors of the score of knowledge include professional title and job satisfaction. **Conclusion.** The current status of ICU nurses' knowledge-attitude-practice regarding postextubation dysphagia in tracheally intubated patients is generally at a moderate to low level, and the level of knowledge-attitude-practice needs to be further improved. **Implications for Nursing Management.** The results of the study showed that the knowledge, attitude, and practice of ICU nurses towards tracheal intubation patients' postextubation dysphagia were in the lower middle level. Therefore, it is necessary to improve the knowledge, attitude, and practice of ICU nurses towards tracheal intubation patients' postextubation dysphagia. This may include, but is not limited to, the development of tools for assessing PED, systematic and professional training, and the development of multidisciplinary collaborative models.

1. Introduction

Tracheal intubation is the most commonly used route for establishing an artificial airway and is mainly used for resuscitation and respiratory support in critically ill patients in the Intensive Care Unit (ICU) [1]. Patients with tracheal intubation are a special group of patients with

postextubation dysphagia (PED) due to the potential for anatomical damage, which can cause oral, pharyngeal, and laryngeal lesions affecting local dynamics and sensitivity, impairing the swallowing protection response and leading to swallowing disorders [2–5]. A current foreign systematic evaluation found a 41.0% incidence of PED in adults with severe disease [6]. Other studies investigating PEDs in

different disease types have shown that the incidence of PEDs ranges from 12.4% to 93.0% [2, 7–10], while studies in China have shown that the incidence of PEDs ranges from 7.1% to 67.2% [11–15]. In addition to having a high incidence, PEDs can have many adverse outcomes. Studies have shown that PED leads to increased risk of aspiration, aspiration pneumonia, delayed oral intake, malnutrition, prolonged ICU stay and total length of stay, increased mortality, etc. [16–18]. PED can persist until discharge and affect prognosis, even taking more than 6 months or years to recover, seriously affecting the efficiency of recovery [7, 19] and increasing the economic burden on the public health system [16].

In the clinical setting, ICU nurses are responsible for observing patients and providing daily care, and their knowledge, attitude, and practice towards PEDs can influence the occurrence and prognosis of PEDs. Studies have shown that ICU nurses can play an important role in managing PEDs and reducing adverse outcomes associated with swallowing [20–22]. Therefore, improving ICU nurses' knowledge, attitude, and practice about PEDs may help to improve the management of PEDs, reduce the impact of risk factors and avoid adverse outcomes, and promote patient recovery [23].

2. Background

Multidisciplinary teams of nurses, doctors, therapists, and speeching-language pathologists (SLPs) are emerging worldwide with effective screening and management processes. Surveys have shown that only 41% of hospitals routinely screen for PEDs and 44% of patients complete a swallowing assessment [24, 25], and less than 50% of hospitals in the USA have developed screening methods for PEDs, with rates of PED assessment varying between hospitals [26]. A review of the literature found that existing studies on the assessment of PEDs have been under-emphasised and that there is a lack of relevant research and guideline norms [27].

In China and abroad, most studies related to PED have focused on investigating its incidence, influencing factors, or exploring the adverse outcomes caused by PED, but no studies have been conducted on ICU nurses' knowledge-attitude-practice regarding PED in tracheally intubated patients. In order to understand the awareness and importance of PEDs among ICU nurses, it is necessary to investigate the current status of their knowledge, attitude, and practice regarding PEDs in tracheally intubated patients and to explore the factors that influence knowledge, attitude, and practice. This will provide a basis for developing targeted training that will help to reduce the incidence of PEDs and adverse outcomes.

3. Methods

3.1. Aim. The aim of this study was to understand the current status of knowledge-attitude-practice of ICU nurses in tertiary care hospitals regarding swallowing disorders after extubation of tracheally intubated patients and to analyse the influencing factors.

3.2. Study Design. A cross-sectional survey design was used.

3.3. Sample and Setting. A convenience sampling method was adopted to select ICU nurses from selected Grade A Hospitals in Northwest, North, and Central China as the study population. The types of ICUs included general ICU and specialized ICU. Inclusion criteria were as follows: (1) those who obtained the nursing practice certificate; (2) ICU staff in service; and (3) informed consent and willingness to cooperate with the survey. Exclusion criteria were as follows: ICU nurses on rotation, refresher course, or internship. Based on the descriptive study sample size, the estimated sample size was calculated as 10–15 times the total number of entries in the questionnaire [28] and increased by 10% to eliminate the effect of the presence of unqualified questionnaires [29], as the finalised questionnaire had a total of 30 entries, i.e., $\text{sample size} = \text{number of entries} \times (10-15) \times (1 + 10\%) = (385-495)$, and finally the above sample size requirements and the composition of ICU nurses in the surveyed hospitals were integrated. Finally, 627 participants were enrolled in the study.

3.4. Instruments. The Questionnaire on ICU Nurses' Knowledge, Attitude, and Practice of Postextubation Swallowing Disorders in Patients with Tracheal Intubation consists of two parts: (i) a questionnaire on general demographic information of ICU nurses; and (ii) a questionnaire on ICU nurses' knowledge, attitude, and practice of postextubation swallowing disorders in patients with tracheal intubation (final questionnaire determined after item analysis and reliability testing), with a total of 30 items. Instrument details are given in supplemental files (available here).

3.4.1. A Questionnaire on General Demographic Information of ICU Nurses. The demographic survey items measured gender, age, nationality, marital status, education, section, years of experience, title, whether they are a manager, satisfaction with their job, mode of employment, and frequency of night shifts.

3.4.2. The ICU Nurses' Knowledge-Attitude-Practice Questionnaire on Postextubation Dysphagia in Patients with Tracheal Intubation. The questionnaire was developed through the construction of an initial pool of questionnaire items, two rounds of Delphi expert correspondence, item analysis, and reliability testing. A total of 300 questionnaires were sent out as reliability and validity tests, and 276 valid questionnaires were finally collected, with a recovery rate of 92.00%. The questionnaire consisted of 30 items in 3 dimensions: knowledge, attitude, and practice. Cronbach's alpha coefficient was 0.901, and the retest reliability was 0.990. The content validity (I-CVI) of each item ranged from 0.88 to 1.00 and the S-CVI/UA was 0.90. No exploratory factor analysis was required, and one common factor was extracted by exploratory factor analysis for the attitude and practice sections, with a cumulative variance contribution of 67.86% and 81.04%, which met the corresponding requirements.

3.5. Data Collection. With the help of the supervisor and relevant staff, the ICU nurse manager and the person in charge of the hospital being surveyed were contacted in advance to explain the content, purpose, and significance of the survey and to obtain cooperation. The survey was conducted using a uniform questionnaire guideline and method of completion and was carried out by the subject team members through paper or online questionnaires. The data were collected in Chinese and translated by the team. Then the English teacher of Lanzhou University was asked to proofread and finally translate the same into English.

3.6. Data Analysis. The data obtained from the research were evaluated using the SPSS 25.0 package program. The measurement data were expressed as mean and standard deviation using independent samples *t*-test or one-way ANOVA; the count data were described by frequency, composition ratio (%), and percentage (%). Pearson correlation analysis was used to explore the relationship between knowledge, attitude, and practice scores. Multiple linear regression analysis was used to analyse the factors influencing ICU nurses' knowledge-attitude-practice towards tracheal intubation patients with PED. In all analyses, $p < 0.05$ was set for significance.

3.7. Ethics Review. The study was reviewed and approved by the Institutional Review Board of Lanzhou University (no: LZUHLXY20200030). Informed consent was obtained from all participants.

4. Results

4.1. Demographic Characteristics. A total of 647 questionnaires were distributed and 627 valid questionnaires were finally returned, with a valid return rate of 96.91%. As shown in Table 1, 79% of the participants were female ($n = 496$), 37% of the nurses were between 26 and 30 years of age ($n = 233$), 69% were unmarried ($n = 435$), and 60% had a Bachelor's degree as their highest level of education ($n = 379$). 53% ($n = 332$) and 47% ($n = 295$) of the nurses were working in the general ICU and specialized ICU, respectively. In addition, 57% of the nurses had worked for 1–5 years ($n = 359$), 63% of the nurses had a junior title ($n = 393$), 20% of the participants were managers ($n = 123$), 19% of the nurses were very satisfied with their job ($n = 118$), 4% were very dissatisfied ($n = 25$), 56% of the nurses were contractual workers ($n = 354$), and 41% of the nurses work 5–8 night shifts a month ($n = 260$) and only 12% do not have to work night shifts ($n = 75$).

4.2. ICU Nurses' Knowledge-Attitude-Practice Level of PED. The results in Tables 2 and 3 show that the total score of knowledge-attitude-practice for PED was (18.88 ± 5.18), which was converted to a standard score of (62.90 ± 17.27). The scores of the three dimensions of knowledge, attitude, and

TABLE 1: Demographic characteristics of nurses ($N = 627$).

Characteristics	N	%
Gender		
Male	131	20.89
Female	496	79.11
Age (years)		
20–25	137	21.85
26–30	233	37.16
31–35	120	19.14
36–40	78	12.44
>40	59	9.41
Nationality		
The Han nationality	578	92.19
Other nationalities	49	7.81
Marital		
Unmarried	192	30.62
Married	435	69.38
Education		
Health vocational high school	193	30.78
Bachelor's degree	379	60.45
Master's degree and above	55	8.77
Section		
General ICU	332	52.95
Specialized ICU	295	47.05
Years of working in the ICU		
1–5	359	57.26
6–10	181	28.87
11–15	54	8.61
>15	33	5.26
Professional title		
Senior	393	62.68
Intermediate	176	28.07
Junior	58	9.25
Be a manager or not		
Yes	123	19.62
No	504	80.38
Job satisfaction		
Very satisfied	118	18.82
More satisfied	255	40.67
Fair	181	28.87
Not very satisfied	48	7.66
Very dissatisfied	25	3.99
Mode of employment		
Formal	183	29.19
Contract	354	56.46
Personnel agency	90	14.35
Number of night shifts		
0	75	11.96
1–4	146	23.29
5–8	260	41.47
>8	146	23.29

practice were (6.46 ± 3.09), (7.53 ± 1.69), and (4.89 ± 2.00), which were converted to a standard score of (64.6 ± 30.90), (75.30 ± 16.90), and (48.90 ± 20.00), respectively. Of the 3 dimensions and the total scores, the attitude dimension scores were good at the upper middle level, the knowledge dimension scores and the total scores of knowledge-attitude-practice were at the lower middle level, and the practice dimension scores were only at the poor level.

TABLE 2: ICU nurses' scores on KAP dimensions of PED and total scores ($N=627$).

	Range	Score	Standard score
Knowledge	0~10	6.46 ± 3.09	64.60 ± 30.90
Attitude	2~10	7.53 ± 1.69	75.30 ± 16.90
Practice	2~10	4.89 ± 2.00	48.90 ± 20.00
Total score	4~30	18.88 ± 5.18	62.90 ± 17.27

TABLE 3: Rating of ICU nurses' total PED knowledge-attitude-practice scores and standard scores for the three dimensions ($N=627$).

Level	Knowledge, N (%)	Attitude, N (%)	Practice, N (%)
Good	225 (35.89)	190 (30.30)	31 (4.94)
Medium	191 (30.46)	340 (54.23)	179 (28.55)
Poor	211 (33.65)	97 (15.47)	417 (66.51)

4.3. Perceived Levels of Each Dimension of the Questionnaire.

In the knowledge dimension, nurses had the least knowledge about the incidence of PED (K2, 43%) and the most knowledge about clinical manifestations (K4, 79%). In the attitude dimension, the lowest score is the enthusiasm of learning PED knowledge. In the practice dimension, the scores of those who received PED related training were the lowest, and the scores of those who responded to the department in time when they encountered related problems were the highest. The score range of attitude dimension is 0.71–0.77, and the score range of practice dimension is 0.42–0.55. The results are shown in Tables 4–6.

4.4. *Univariate Analysis of the Scores of Knowledge, Attitude, and Practice and Total Scores against Sociodemographic and Professional Variables.* Statistical differences in the knowledge and attitude scores and total scores were observed in different groups of gender, age, nationality, education, years of work, job satisfaction, and mode of employment ($p < 0.05$). The difference between knowledge score and number of night shifts was statistically significant ($p = 0.047$). The differences between the total score of questionnaire ($p = 0.008$) and attitude scores ($p = 0.003$) and professional title were statistically significant. There were statistically significant differences in attitude scores between their marital ($p = 0.037$) and section ($p < 0.001$). There were statistically significant differences between practice score and nationality, education, professional title, and job satisfaction ($p < 0.05$). More detailed information is given in Table 7.

4.5. *Multiple Linear Regression Analysis.* Multiple linear regression analysis showed that the factors affecting the total score of PED among ICU nurses were age (31–35: $\beta = 0.106$, $p = 0.018$; 36–40: $\beta = 0.199$, $p < 0.001$; >40: $\beta = 0.203$, $p < 0.001$), nationality ($\beta = -0.128$, $p < 0.001$), professional title (intermediate: $\beta = -0.126$, $p = 0.003$; junior: $\beta = -0.220$, $p < 0.001$), job satisfaction (more satisfied: $\beta = -0.235$, $p < 0.001$; fair: $\beta = -0.320$, $p < 0.001$; not very satisfied: $\beta = -0.261$, $p < 0.001$; very dissatisfied: $\beta = -0.259$,

$p < 0.001$), and mode of employment ($\beta = -0.110$, $p = 0.009$). Gender ($\beta = 0.088$, $p = 0.025$), age (31–35: $\beta = 0.104$, $p = 0.028$; 36–40: $\beta = 0.177$, $p < 0.001$; >40: $\beta = 0.169$, $p < 0.001$), nationality ($\beta = -0.150$, $p < 0.001$), and job satisfaction (more satisfied: $\beta = -0.122$, $p = 0.018$; fair: $\beta = -0.220$, $p < 0.001$; not very satisfied: $\beta = -0.153$, $p < 0.001$; very dissatisfied: $\beta = -0.205$, $p < 0.001$) were the factors that influenced the score of knowledge. The influencing factors of attitude score include gender ($\beta = 0.078$, $p = 0.024$), age (31–35: $\beta = 0.210$, $p < 0.001$; 36–40: $\beta = 0.305$, $p < 0.001$; >40: $\beta = 0.369$, $p < 0.001$), nationality ($\beta = -0.237$, $p < 0.001$), section ($\beta = -0.088$, $p = 0.007$), professional title (intermediate: $\beta = -0.208$, $p < 0.001$; junior: $\beta = -0.332$, $p < 0.001$), job satisfaction (more satisfied: $\beta = -0.219$, $p < 0.001$; fair: $\beta = -0.247$, $p < 0.001$; not very satisfied: $\beta = -0.263$, $p < 0.001$; very dissatisfied: $\beta = -0.268$, $p < 0.001$), and mode of employment ($\beta = -0.162$, $p < 0.001$). The influencing factors of the score of practice include professional title ($\beta = -0.107$, $p = 0.007$) and job satisfaction (more satisfied: $\beta = -0.202$, $p < 0.001$; fair: $\beta = -0.261$, $p < 0.001$; not very satisfied: $\beta = -0.244$, $p < 0.001$; very dissatisfied: $\beta = -0.159$, $p < 0.001$). More detailed information is given in Table 8.

5. Discussion

5.1. *ICU Nurses Need to Improve Their Knowledge, Attitude, and Practice of PEDs.* A survey of 627 ICU nurses in some Grade A Hospitals in Gansu Province of China showed that ICU nurses' knowledge, attitude, and practice about PEDs are poor and need to be further improved, especially to regulate their practices.

According to the descriptive statistical analysis, in the knowledge dimension, ICU nurses still do not know the incidence of PED, which may be related to the unclear status of PED research because they do not consult relevant literature, but they have a good grasp of basic knowledge. At the same time, the scores of ICU nurses in the items related to PED bedside assessment methods, surgical methods, and rehabilitation training were relatively low, reflecting that ICU nurses should focus on improving their mastery of PED special expertise. In the attitude dimension, the subjective initiative of ICU nurses to PED independent learning is poor, so it is suggested to take measures such as reward and punishment to promote the initiative of ICU nurses to improve independent learning. In the practice dimension, the frequency of ICU nurses receiving relevant training is low, and the frequency of their feedback-related problems is relatively high, which suggests that the department managers should increase the professional knowledge and skills training about PED and actively take effective measures to solve the PED problems in the nursing process.

5.2. *Factors Influencing ICU Nurses' Knowledge, Attitude, and Practice about PEDs Are Diverse.* The higher the age, the higher the knowledge-attitude-practice score. From the univariate analysis, it was found that ICU nurses aged

TABLE 4: Nursing knowledge about tracheal intubation patients' postextubation dysphagia (PED).

Asked questions	True N (%)
K1: definition of postextubation dysphagia (PED)	460 (73.37)
K2: incidence rate of postextubation dysphagia (PED)	269 (42.90)
K3: potential mechanism of PED occurrence	434 (69.22)
K4: clinical manifestation of PED	495 (78.95)
K5: poor outcomes resulting from the PED	474 (75.60)
K6: risk factors for PED	446 (71.13)
K7: assessment method of PED	370 (59.01)
K8: bedside assessment method	352 (56.14)
K9: PED for surgical procedures	355 (56.62)
K10: training methods and therapeutic means to promote the recovery of swallowing function	397 (63.32)

TABLE 5: ICU nurses' attitude towards tracheal intubation patients' postextubation dysphagia.

Subject (N, %)	Strongly agree	Agree more	Generally agree	Not agree with	Disagree	Score
A1: interests	172 (27.43)	216 (34.45)	157 (25.04)	43 (6.86)	39 (6.22)	0.74 ± 0.23
A2: initiative study	145 (23.13)	192 (30.62)	195 (31.10)	51 (8.13)	44 (7.02)	0.71 ± 0.23
A3: training	227 (36.20)	199 (31.74)	120 (19.14)	40 (6.38)	41 (6.54)	0.77 ± 0.23
A4: acquisition of knowledge	213 (33.97)	215 (34.29)	116 (18.50)	51 (8.13)	32 (5.10)	0.77 ± 0.23
A5: solve problems proactively	160 (25.52)	217 (34.61)	148 (23.60)	63 (10.05)	39 (6.22)	0.73 ± 0.23
A6: screening and assessment	201 (32.06)	230 (36.68)	113 (18.02)	46 (7.34)	37 (5.90)	0.76 ± 0.23
A7: work procedure	192 (30.62)	230 (36.68)	136 (21.69)	42 (6.70)	27 (4.31)	0.77 ± 0.21
A8: family compatibility	206 (32.85)	223 (35.57)	116 (18.50)	46 (7.34)	36 (5.74)	0.76 ± 0.23
A9: patient functional training	196 (31.26)	233 (37.16)	116 (18.50)	49 (7.81)	33 (5.26)	0.76 ± 0.22
A10: management of PED	199 (31.74)	221 (35.25)	114 (18.18)	63 (10.05)	30 (4.78)	0.76 ± 0.23

A7 and A10 are reverse questions, which have been normalised.

≥31 years scored higher than those aged between 20 and 30 years, but as the overall score of knowledge-attitude-practice was at a moderate to low level, it was suggested that nursing managers should give more learning opportunities and training guidance to ICU nurses aged ≥31 years, so that they can give full play to their leading role and guide and supervise young nurses to actively learn, thus creating a good learning atmosphere in the department. This will help to improve their knowledge of PEDs and improve their attitudes. The results of the multivariate analysis found that ICU nurses aged 26–30 years old had no significance in the above scores compared to ICU nurses aged 20–25 years old, which may be related to the smaller age gap and shorter working years. As the ICU is a highly specialized unit, the older ICU nurses had more clinical experience and were better able to anticipate the clinical implications of PED-related treatment and care for patients with extubation than the younger nurses, so they were able to pay some attention to it [30].

The lower the professional title, the higher the knowledge-attitude-practice score. Caring for patients with tracheal intubation and preventing them from developing PEDs is a more specific clinical task, and as most of those with senior and intermediate titles are head nurses or above in management, they have some critical thinking and decision-making power and are responsible for taking control of

the whole, but those with junior titles are more focused on specific clinical tasks in the ICU and have more exposure to PED-related knowledge and clinical practice in their work [31]. Those with senior titles scored lower on the attitude dimension, indicating that they place less emphasis on PEDs.

The higher the level of job satisfaction, the higher the total score and each dimension of knowledge-attitude-practice. Studies have shown that nurses' job satisfaction is related to their physical and mental health status [32, 33]. If they are in a long-term physical and mental subhealthy state, it will not only lead to a decrease in job satisfaction, cause a high turnover rate, and reduce work efficiency but also lead to adverse events and reduce their professional identity of nursing work, thus affecting their work attitude. Unit or hospital managers can improve the job satisfaction of ICU nurses by adopting measures such as creating a supportive nursing work environment, developing a reasonable performance allocation system, and providing appropriate incentives, which will increase motivation and help to urge them to learn about PEDs and improve their attitudes and practices.

Formal ICU nurses scored higher than those employed by other forms of employment. Compared to nurses in other modes of employment, they are likely to have more opportunities for further study and training and are therefore better

TABLE 6: ICU nurses' practices towards tracheal intubation patients' postextubation dysphagia.

Subject (N, %)	Always	Often	Sometimes	Occasionally	Never	Score
P1: initiative study	31 (4.94)	43 (6.86)	146 (23.29)	240 (38.28)	167 (26.63)	0.45 ± 0.22
P2: receive training	28 (4.47)	40 (6.38)	133 (21.21)	182 (29.03)	244 (38.92)	0.42 ± 0.22
P3: take preventive measures	39 (6.22)	66 (10.53)	185 (29.51)	183 (29.19)	154 (24.56)	0.49 ± 0.23
P4: proactive screening or assessment	32 (5.10)	60 (9.57)	152 (24.24)	189 (30.14)	194 (30.94)	0.46 ± 0.23
P5: adjust your diet	37 (5.90)	79 (12.60)	153 (24.40)	186 (29.67)	172 (27.43)	0.48 ± 0.24
P6: take treatment	41 (6.54)	89 (14.19)	172 (27.43)	182 (29.03)	143 (22.81)	0.51 ± 0.24
P7: exercise to promote the recovery of swallowing function	38 (6.06)	75 (11.96)	155 (24.72)	193 (30.78)	166 (26.48)	0.48 ± 0.23
P8: encourage patients to participate in rehabilitation training	50 (7.97)	106 (16.91)	168 (26.79)	177 (28.23)	126 (20.10)	0.53 ± 0.24
P9: understand the patient's mental state	51 (8.13)	110 (17.54)	157 (25.04)	182 (29.03)	127 (20.26)	0.53 ± 0.24
P10: feedback related issues proactively	102 (16.27)	77 (12.28)	155 (24.72)	151 (24.08)	142 (22.65)	0.55 ± 0.27

TABLE 7: Univariate analysis of knowledge, attitude, and practice and total scores against sociodemographic and professional variables.

	Knowledge		Attitude		Practice		Total scores	
	<i>t/F</i>	<i>p</i>	<i>t/F</i>	<i>p</i>	<i>t/F</i>	<i>p</i>	<i>t/F</i>	<i>p</i>
Gender	-2.896	0.004	-3.642	<0.001	0.812	0.284	-3.236	0.001
Age	10.134 ^a	<0.001	17.081 ^a	<0.001	0.830	0.507	10.002 ^a	<0.001
Nationality	7.063	<0.001	11.485	<0.001	4.728	<0.001	8.416	<0.001
Marital	-0.527	0.599	-2.085	0.037	0.642	0.521	-0.745	0.457
Education	3.029	0.049	13.260 ^a	<0.001	3.638 ^a	0.029	5.826 ^a	0.004
Section	0.654	0.514	3.773	<0.001	-0.064	0.949	-0.289	0.773
Years of work	7.997 ^a	<0.001	10.416 ^a	<0.001	0.244	0.865	6.389 ^a	<0.001
Professional title	2.204 ^a	0.114	6.111 ^a	0.003	4.800 ^a	0.009	5.032 ^a	0.008
Be a manager or not	1.273	0.203	-0.150	0.865	-0.732	0.465	0.387	0.699
Job satisfaction	12.752	<0.001	19.372 ^a	<0.001	11.460 ^a	<0.001	20.469 ^a	<0.001
Mode of employment	7.343	0.001	11.212 ^a	<0.001	1.557	0.212	7.858	0.001
Number of night shifts	2.665	0.047	0.353 ^a	0.763	1.032	0.378	0.698	0.553

^a*p* value is calculated using Welch's *t*-test.

TABLE 8: Multiple linear regression for variables contributing to knowledge, attitude, and practice and total scores.

Variables	B	SE	β	<i>t</i>	<i>p</i>	95.0% CI	
<i>Total score</i>							
Constants	25.926	1.099		23.598	<0.001	23.768	28.083
<i>Age</i>							
20~25	Ref						
26~30	0.121	0.485	0.011	0.249	0.804	-0.832	1.073
31~35	1.398	0.591	0.106	2.368	0.018	0.239	2.558
36~40	3.129	0.721	0.199	4.339	<0.001	1.713	4.546
>40	3.609	0.871	0.203	4.146	<0.001	1.899	5.319
Nationality	-3.515	0.723	-0.128	-4.865	<0.001	-4.934	-2.096
<i>Professional title</i>							
Senior	Ref						
Intermediate	-1.449	0.490	-0.126	-2.955	0.003	-2.412	-0.486
Junior	-3.941	0.759	-0.220	-5.189	<0.001	-5.432	-2.449
<i>Job satisfaction</i>							
Very satisfied	Ref						
More satisfied	-2.476	0.502	-0.235	-4.932	<0.001	-3.462	-1.490
Fair	-3.657	0.529	-0.320	-6.913	<0.001	-4.695	-2.618
Not very satisfied	-5.085	0.771	-0.261	-6.598	<0.001	-6.598	-3.571
Very dissatisfied	-6.855	0.992	-0.259	-6.908	<0.001	-8.804	-4.906
<i>Mode of employment</i>							
Formal establishment	Ref						
Contractual appointment	-0.804	0.489	-0.077	-1.642	0.101	-1.765	0.157
Personnel agency	-1.619	0.615	-0.110	-2.633	0.009	-2.826	-0.412
<i>Knowledge</i>							
Constants	7.478	0.888		8.419	<0.001	5.734	9.223
Gender	0.671	0.298	0.088	2.250	0.025	0.085	1.256
<i>Age</i>							
20~25	Ref						
26~30	0.331	0.313	0.052	1.056	0.291	-0.284	0.946
31~35	0.813	0.369	0.104	2.204	0.028	0.089	1.537
36~40	1.655	0.413	0.177	4.003	<0.001	0.843	2.467
>40	1.783	0.465	0.169	3.836	<0.001	0.870	2.695
Ethnic	-1.723	0.455	-0.150	-3.791	<0.001	-2.616	-0.831
<i>Job satisfaction</i>							
Very satisfied	Ref						
More satisfied	-0.769	0.323	-0.122	-2.381	0.018	-1.403	-0.135
Fair	-1.503	0.340	-0.220	-4.418	<0.001	-2.170	-0.835
Not very satisfied	-1.774	0.493	-0.153	-3.599	<0.001	-2.742	-0.806
Very dissatisfied	-3.229	0.642	-0.205	-5.032	<0.001	-4.489	-1.969

TABLE 8: Continued.

Variables	B	SE	β	<i>t</i>	<i>p</i>	95.0% CI	
<i>Attitude</i>							
Constants	8.272	0.214		38.634	<0.001	7.852	8.693
Gender	0.326	0.144	0.078	2.271	0.024	0.044	0.608
Age							
20~25	Ref						
26~30	0.183	0.153	0.052	1.196	0.232	-0.117	0.482
31~35	0.904	0.183	0.210	4.950	<0.001	0.545	1.263
36~40	1.564	0.223	0.305	7.027	<0.001	1.127	2.001
>40	2.136	0.267	0.369	8.009	<0.001	1.613	2.660
Ethnic	-1.493	0.224	-0.237	-6.653	<0.001	-1.934	-1.053
Section	-0.063	0.024	-0.088	-2.684	0.007	-0.110	-0.017
Professional title							
Senior	Ref						
Intermediate	-0.782	0.154	-0.208	-5.080	<0.001	-1.084	-0.480
Junior	-1.936	0.234	-0.332	-8.288	<0.001	-2.395	-1.477
Job satisfaction							
Very satisfied	Ref						
More satisfied	-0.753	0.160	-0.219	-4.719	<0.001	-1.066	-0.439
Fair	-0.922	0.168	-0.247	-5.487	<0.001	-1.252	-0.592
Not very satisfied	-1.674	0.245	-0.263	-6.840	<0.001	-2.154	-1.193
Very dissatisfied	-2.318	0.314	-0.268	-7.379	<0.001	-2.935	-1.701
Mode of employment							
Formal establishment	Ref						
Contractual appointment	-0.137	0.155	-0.040	-0.886	0.376	-0.442	0.167
Personnel agency	-0.784	0.194	-0.162	-4.034	<0.001	-1.165	-0.402
<i>Practice</i>							
Constants	5.869	0.184		31.917	<0.001	5.508	5.869
Professional title							
Senior	Ref						
Intermediate	-0.147	0.177	-0.033	-0.828	0.408	-0.494	-0.147
Junior	-0.739	0.273	-0.107	-2.710	0.007	-1.275	-0.739
Job satisfaction							
Very satisfied	Ref						
More satisfied	-0.822	0.216	-0.202	-3.803	<0.001	-1.247	-0.822
Fair	-1.155	0.230	-0.261	-5.027	<0.001	-1.607	-1.155
Not very satisfied	-1.835	0.334	-0.244	-5.498	<0.001	-2.491	-1.835
Very dissatisfied	-1.632	0.427	-0.159	-3.821	<0.001	-2.470	-1.632

able to acquire more PED-related knowledge, have a more positive attitude, apply their knowledge in their daily nursing work, and have a stronger sense of professional identity.

6. Conclusion

This study investigated for the first time the current situation of PED knowledge-attitude-practice of ICU nurses in some tertiary level A hospitals in Gansu Province, analysed the factors affecting their knowledge-attitude-practice level, and, based on the results of the study, proposed methods for improvement, providing a basis and suggestions for better care of PED patients and enabling them to carry out appropriate PED training, which has certain theoretical and practical application value.

However, only ICU nurses in some tertiary hospitals in Gansu Province were surveyed, and the location and hospital level of the selected sample had certain limitations, leading to possible regional bias and selection bias. Therefore, the selection of representative hospitals of different grades across the country to expand the sample size is a future research work.

7. Implications for Nursing Management

The results of the study showed that the knowledge, attitude, and practice of ICU nurses towards tracheal intubation patients' postextubation dysphagia were in the lower middle level. Therefore, it is necessary to improve the knowledge, attitude, and practice of ICU nurses towards tracheal

intubation patients' postextubation dysphagia. This may include, but is not limited to, the development of tools for assessing PED, systematic and professional training, and the development of multidisciplinary collaborative models.

Data Availability

All data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Lei Tao and Lin Yang are co-first authors.

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Supplementary Materials

Instrument. The Questionnaire on ICU Nurses' Knowledge, Attitude, and Practice of Postextubation Swallowing Disorders in Patients with Tracheal Intubation was the research tool of this study. (*Supplementary Materials*)

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Research Article

Knowledge, Attitudes, and Practices Two Years after the Start of the COVID-19 Pandemic: A Mixed Methods Study

Teresa Botigué ^{1,2,3} Carla Camí ¹ Laia Selva-Pareja ^{1,3,4} Olga Masot ^{1,2,3}
Anna Espart ^{1,2,3,4} Carme Campoy^{1,5} and Judith Roca ^{1,2,3}

¹Department of Nursing and Physiotherapy, University of Lleida, Lleida 25198, Spain

²Health Care Research Group (GRECS), Biomedical Research Institute of Lleida, Lleida 25198, Spain

³Health Education, Nursing, Sustainability and Innovation Research Group (GREISI), University of Lleida, Lleida, Spain

⁴Chair of Development of Health and Sustainability Organizations and Territories (DOTSS), University of Lleida, Lleida 25001, Spain

⁵African Societies Studies Group (GESA), University of Lleida, Lleida, Spain

Correspondence should be addressed to Laia Selva-Pareja; laia.selva@udl.cat

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Introduction. During the COVID-19 pandemic, there was a need to promote the most adequate behaviors. It is essential to know what aspects were implemented and what needs to be re-enforced. **Objectives.** (a) To identify the knowledge and behaviors related with preventive measures, lifestyle habits, sources of information, vaccination, and emotions generated and coping strategies and (b) to explore the personal experiences with respect to the knowledge, attitudes, and practices when facing COVID-19. **Design.** A convergent mixed method design. **Setting and Participants.** This study was conducted in the Segrià region (Catalonia, Spain) during the months of January and February 2022, with individuals 18 years old or older. **Methods.** Based on variables proposed by the WHO and a bibliographic review, an ad hoc electronic survey was utilized for the quantitative part, analyzed through frequency distribution or central tendency and dispersion measurements. For the qualitative part, two focus groups were analyzed through content analysis. **Results.** The participants (n QUAN = 1,559; n QUAL = 19) were aware about and applied the prevention measures, but when delving into it, deficiencies were detected especially when referring to hand-washing; lifestyles remained healthy; the population trusted the information from professionals (78.8%), but excess of information led to saturation; protection (75.3%) and herd immunity (47.2%) were recognized with vaccination; and the psychological impact (69.5%) was buffered with the activation of positive coping measures (99.1%), although it was maintained in more than half of them. **Conclusions.** This study showed that prevention measures must be re-enforced, especially hand-washing. Another revealing aspect was psychological impact, which, although coping measures were utilized, was maintained for another two years in most of them. This evidences the need for an intervention centered on this to guarantee the mental health of the population. **Implications for Nursing Management.** The detection of the current needs of the population provides the information necessary for the design of an adapted intervention and for promoting health education programs to address COVID-19 or other future health situations.

1. Introduction

In March, 2020, the World Health Organization (WHO) defined COVID-19 as a global pandemic [1]. This pandemic led to an unprecedented situation, unleashing an important crisis in public health. The outbreak of the virus was a worldwide health threat with consequences at different levels [2]. Faced with this situation, a need arose to rapidly and constantly

interact with society to provide information about course of COVID-19 and about the protection or treatment measures at each stage [3]. In this sense, the available evidence showed how high levels of knowledge about COVID-19 were associated with a positive attitude and correct behaviors [4]. On the contrary, individuals with low levels of knowledge had a lower probability of having the adequate attitudes and preventive behaviors [5].

Health Education (HE) is a useful tool for guaranteeing an adequate level of health-related knowledge, as it promotes behaviors that favor the health of the general population [6]. Also, HE provides the necessary tools for acquiring critical thinking skills, to be able to decide on health matters. Nevertheless, HE goes beyond increasing one's knowledge about personal health-related behaviors, as its intention is to also deploy skills and actions to address determinant social, economic, and environmental factors of health [7]. The first phases of an HE program are the analysis of reality and the detection of needs. Once these are identified, they will allow the design of an intervention adapted to current reality and needs [8].

Thus, after more than two years of pandemic and as evidence was not found in our context, a decision was made to assess the consequences of the pandemic and to delve into the knowledge acquired and that which must be re-enforced. Given that knowledge about this disease has evolved since the start of the pandemic, with the development of specific measures of virus response and containment that are adapted to the WHO guidelines [9]. To provide some context to the situation, at the start of 2022, Catalonia (Spain) was recovering from the seventh wave, and the most dominant variant of SARS-CoV-2 was Omicron, characterized by its fast propagation [10]. According to the Health Ministry of Spain [11], on February 15th, 2022, there was a total of 41,007,734 people with at least one dose of the vaccine (86.6% of the Spanish population), and a total of 38,385,465 with the full vaccination (81.0%).

Given the reasons described above and starting with the following research question—What behaviors were adopted by the general population two years after the COVID-19 pandemic?—the general research objective was to analyze the knowledge, attitudes, and practices associated with COVID-19. More specifically, the secondary objectives of the present study were the following: (a) to identify the knowledge and behaviors related with preventive measures, lifestyle habits, sources of information, vaccination, and the emotions created and coping strategies and (b) to explore the personal experiences related with knowledge, attitudes, and practices associated with COVID-19. This analysis will provide the information necessary to address the lack of knowledge, erroneous ideas, or practices, to therefore modify preventive or health awareness programs [12]. It is indispensable for the general population to integrate this information, so that everyone is able to freely, voluntarily, and rationally make health-related decisions [13].

2. Materials and Methods

2.1. Study Design. The present study is part of the project entitled: *Science-Based Education and Communication to Fight COVID-19 and Future Pandemics* (IlerCOVID). This project is centered on strengthening scientific knowledge about COVID-19 and pandemics in the Segrià region (Catalonia, Spain). It combines four work areas: artificial intelligence, plant biotechnology and neuroCovid, education, and communication. The present study corresponds to the working area of education and includes a HE program

based on a brief group education intervention, more specifically on the development of the first phases of the program, in which the knowledge of the population is explored and detailed.

Thus, in line with the objectives described, a study is presented with a convergent mixed methods design [14]. More specifically, the quantitative (QUAN) and qualitative (QUAL) data were collected during a similar amount of time. Afterwards, the two types of data were analyzed separately and in parallel. Lastly, the data were combined, which allowed for a more in-depth exploration of the phenomenon under study.

2.2. Context and Participants. The study population in the QUAN part corresponded to individuals 18 years old or older from the different municipalities of the Segrià region. More specifically, according to the data from the Catalanian Statistics Institute, dated January 1, 2021, the total population in the 38 municipalities was 211,609 individuals, of which 81.8% were 18 years old or older (173,010 individuals). The sample size was calculated to estimate a proportion, and given that many parameters were to be assessed, a maximum indetermination ($p = 0.50$) position was selected, with a confidence interval of 95%, and assuming a sampling error (ϵ) of 3%, which resulted in a sample of 1,062 individuals.

As for the QUAL part, a purposeful sampling method was utilized [15]. The sampling strategy used maximum variation to achieve sample heterogeneity, based on two aspects: (1) willingness to participate and (2) representation of the general population without excluding any socio-demographic category. Thus, the inclusion criteria were broad in order to obtain diverse and rich information on the phenomenon studied: people older than 18 years, from different age groups, without specifying education or limits according to economic level, and who resided in the Segrià region during the COVID-19 pandemic. As for the exclusion criteria, these were individuals with communication problems, with a language barrier with Catalan or Spanish, or with cognitive problems.

2.3. Instruments and Data Collection. For the collection of QUAN data, an ad hoc electronic survey was designed. The variables proposed by the WHO Regional Office for Europe [16] were used. These variables were measured using validated questions or adapted validated questions. The questionnaire as a whole was validated through the six rounds of data collection in Germany. It was translated following the recommendation from the guide itself. Nevertheless, the answers to some of the questions had to be adapted to the country where the study took place, as many of the measures and actions related to COVID-19 were dependent on the national context. Thus, a bibliographic review was performed to adapt the questions to the specific geographical context. Ultimately, 34 questions were included, grouped into 6 sections: (1) sociodemographic data (age, sex, and level of education), (2) COVID-19 preventive measures, (3) lifestyle habits, (4) sources of information, (5) vaccination, and (6) emotions generated and coping strategies. Also, the

recommendations on sample sized were followed, as a sample greater than 1000 participants was included. The Pointerpro platform was utilized, and all the city council from each municipality were contacted for the distribution of digital media, during the months of January and February 2022.

In addition, for the collection of the QUAL data, two focus groups were convened in two randomly selected populations in February 2022. Three areas were explored: knowledge, attitudes, and practices (Table 1). The participants were volunteers recruited by the city councils in each municipality through personal contacts and their social networks or dissemination media.

The focus groups met in municipal rooms and were guided by two researchers (JR and CC), an expert senior researcher in QUAL methodology and a novel researcher. These sessions lasted between 90 and 100 minutes. They were audio-recorded for their posterior literal translation. The participants accepted the transcriptions.

2.4. Data Analysis. In first place, for the QUAN data, a descriptive analysis of the sample was performed through frequency distribution measurements or measurements of central tendency and dispersion, as a function of the nature of the variables. The statistical program utilized was Statistical Package of the Social Sciences (SPSS) version 27.

In the QUAL analysis of the data, a series of actions were performed to ensure the criteria of credibility, dependability, and transferability [17, 18]: (1) the participants were selected in heterogeneous manner, which provided rich and varied information; (2) information was provided about the participants and the context; (3) at the start, two researchers (JR and CC) revised the units of meaning, the process of abstraction, condensation, and creation of the categories and the topics independently, to increase credibility, and afterwards, in a joint work session with the entire research team, the thematic areas defined in each analysis were agreed upon and discussed; (4) stopping criteria were defined when no new categories emerged in the last focus group [19]; and (5) lastly, the data collected and results found were compared and contrasted in a final report. The analysis was performed with the Atlas-Ti version 8 software.

2.5. Ethical Approval. The present study was approved by the Drug Research Ethics Committee from the main hospital in the area (CEIC-2593). The electronic survey participants were informed about the voluntary character and anonymity of the survey, and they were explicitly asked to provide their informed consent before answering the survey. The focus group participants were verbally informed by the researchers and signed an informed consent form. All the data were treated with confidentiality and anonymously.

3. Results

The findings from the present study are described in 6 sections (characteristics of the participants, COVID-19 preventive measures, lifestyle habits, sources of information,

vaccination, and emotions generated and coping strategies). The QUAN and QUAL data are combined in these sections. See Table 1 in the Supplementary Material for a detailed summary of the QUAL themes, categories/subcategories, and units of meaning.

3.1. Characteristics of the Participants. In the QUAN part, 1,559 answers were ultimately obtained (46.8% more than the required sample) from individuals living in the Segrià region, aged between 18 and 90 years old, with a mean age of 49.1 years old (SD = 13.4). Women represented 77.4% of the sample, and 51.1% of the participants had a university degree, followed by secondary (40.7%) and primary (8.2%) education.

As for the QUAL part, a total of 19 participants were obtained (9 from Benavent de Segrià and 10 from Corbins). The age range was 18 to 73 years old, with a mean age of 52.6 years (SD = 19.3). More men participated (57.9%) than women, and most of them had primary education (47.4%), followed by secondary (36.8%) and university (15.8%) education.

3.2. COVID-19 Preventive Measures. With respect to the preventive measures, the most recognized by the participants were those related with the use of the face mask (2.3, 2.4, and 2.5), and the least was the option of washing their hands with a hydroalcoholic solution, as shown in Table 2. Only 22.9% identified all the measures that were correct to avoid or reduce COVID-19 infection (* in Table 2).

The participants of the focus groups positively evaluated the use of the face mask, due to its efficacy against other respiratory illnesses (common cold, flu) and affirmed their possible continued use during the transitional period after the pandemic:

“...the mask worked correctly, I think that everyone will use it during winter. The flu and common cold cases have decreased. . .” BM_4

Other measures listed due to their efficacy against the disease were physical distance and ventilation of the spaces:

“Yes, distancing and ventilation, yes. . .they were very beneficial. . .especially ventilation. . .easy to use.” CM_92

More specifically, with respect to hand-washing, a series of statements were made, which the participants had to identify if they were correct or incorrect. Only 5.1% of the sample correctly defined all the responses (* in Table 3). Below, the responses to each of the statements are detailed (Table 3). It should be underlined that most knew about the importance of hand-washing, despite the virus not being transmitted through contact (95.7%) and that only water was not enough (97.9%). On the contrary, only 25.5% knew that it was necessary to dry their hands so that washing was effective and two thirds of the sample did not know that washing had to be done with water and soap if they were dirty.

TABLE 1: Areas explored in the focus groups.

Areas	Question asked
Knowledge	What are the preventive measures to deal with COVID-19? And of these, which do you think are the most effective?
	What is your opinion about information and communication media? Which of them do you trust more?
Attitudes	What is your opinion about the COVID-19 vaccine? What are the reasons of the population for vaccination or not vaccination?
	How do you assess the impact of the pandemic at the emotional and/or with respect to mental health?
	What feelings or emotions has COVID-19 generated? Do you think the feelings or emotions at the start of the pandemic are the same as today?
	Have you overcome these feelings? Or are they still there? To what degree? Do you think the pandemic has provided some positive elements?
Practices	Due to the pandemic, how has your lifestyle changed?

TABLE 2: What measures do you consider important for avoiding or reducing COVID-19 infection?

Measures		Number (<i>n</i>)	Frequency (%)
(1) Washing of hands with soap and water*	Yes	1240	79.5
	No	319	20.5
(2) Washing of hands with hydroalcoholic solution*	Yes	750	48.1
	No	809	51.9
(3) Use of face mask*	Yes	1354	86.9
	No	205	13.1
(4) If the mask is not needed, put it under one's chin, hanging from an ear, or the neck, wrist, on top of the head, and so on	No	1527	97.9
	Yes	32	2.1
(5) Removing one's mask to sneeze, to not get it dirty	No	1511	96.9
	Yes	48	3.1
(6) Avoid touching the eyes, nose, and mouth with hands*	Yes	916	58.8
	No	643	41.2
(7) Avoid greeting other people with two kisses on the cheeks, hugs, or touching hands*	Yes	1007	64.6
	No	552	35.4
(8) Maintain a certain distance (minimum of 1 to 1.5 m) with other people if the mask is not being used*	Yes	1219	78.2
	No	340	21.8
(9) Open windows in reduced or closed spaces*	Yes	1253	80.4
	No	306	19.6
(10) Reduce social relations when COVID-19 symptoms are detected*	Yes	1198	76.8
	No	361	23.2
(11) Vaccinate*	Yes	1232	79.0
	No	327	21.0

*Correct measure for avoiding or reducing COVID-19 infection.

On the other hand, according to the other questions related to hand-washing, 82.4% of the participants believed they had enough knowledge for correct hand hygiene, 71.6% affirmed that washing of hands was an act of responsibility, and 66.6% that their hand hygiene habits had improved due to COVID-19, as they became more aware about its importance. As for the frequency, the daily mean of hand-washing was 12.1 (± 10.0), oscillating between none to 150 times per day. As for the practices of hand-washing (Table 4), only 21% did so on the necessary occasions, with the most prevalent being after going to the bathroom, before eating, and before preparing any kind of food (higher than

90% of the sample), and the least being before going to the bathroom (39.6%).

According to the QUAL data, the general perception of the participants about hand-washing knowledge was good. However, when exploring this aspect more deeply, some did not know about the efficacy of the products they utilized. Confusion was observed between different hand hygiene terms (washing and disinfection of hands) and the efficacy between the hydroalcoholic solution and soap and water:

“...washing of hands is better with soap and water than with the hydroalcoholic solution...” CM_97

TABLE 3: Which of the following statements do you think are true with respect to hand-washing?

Statements		Number (<i>n</i>)	Frequency (%)
The hydroalcoholic solutions can always substitute hand-washing	Incorrect*	1255	80.5
	Correct	304	19.5
How much time is spent when washing one's hands is not important	Incorrect*	1317	84.5
	Correct	242	15.5
Hot water increases the effectiveness of hand-washing	Incorrect*	1286	82.5
	Correct	273	17.5
It is necessary to dry one's hands after washing for it to be effective	Correct*	398	25.5
	Incorrect	1161	74.5
Now, washing one's hands is less important, as it is known that COVID-19 is not transmitted through contact	Incorrect*	1492	95.7
	Correct	67	4.3
Washing one's hands with only water is also correct	Incorrect*	1527	97.9
	Correct	32	2.1
Hands must be washed with soap and water when they are dirty	Correct*	558	35.8
	Incorrect	1001	64.2

*Correct answer.

TABLE 4: When do you wash your hands?

Hand-washing occasions*		Number (<i>n</i>)	Frequency (%)
Before going to the bathroom	Yes	617	39.6
	No	942	60.4
After going to the bathroom	Yes	1488	95.4
	No	71	4.6
Before eating	Yes	1485	95.3
	No	74	4.7
After eating	Yes	941	60.4
	No	618	39.6
When getting home or when going into buildings	Yes	1261	80.9
	No	298	19.1
Before preparing any food	Yes	1437	92.2
	No	122	7.8
After blowing one's nose, cough or sneeze	Yes	1063	68.2
	No	496	31.8
After touching rubbish or money	Yes	1302	83.5
	No	257	16.5
After touching outdoor surfaces	Yes	944	60.6
	No	615	39.4
Before visiting someone who is ill	Yes	1070	68.6
	No	489	31.4
After visiting someone who is ill	Yes	1140	73.1
	No	419	26.9
After touching animals	Yes	1024	65.7
	No	535	34.3

*All hand-washing occasions are necessary.

“Anything is useful.” CM_98

It should also be mentioned that only a small number of participants was aware that their hand-washing behavior was not correct:

“We don't wash our hands well!” BM_77

3.3. Lifestyle Habits. With respect to the eating habits, the daily mean portions of fruit and vegetables were 3.4 (SD = 1.6), with the weekly mean for legumes being 2.2 (SD = 1.3). As for the consumption of red meat and ultra-processed foods, about 2 weekly portions (2.1 ± 1.6 and 2.0 ± 2.0 , respectively) and sugary drinks were consumed 1.2 ± 2.2 times on average. As for the practice of physical

exercise, 56.8% of the sample did so in a planned manner, with a mean of 4 hours per week. And lastly, with respect to toxic habits, 34.1% of the participants had them, with the most prevalent being the consumption of alcoholic drinks (19.6%) and tobacco (18.7%), followed by self-medication (4.7%) and taking narcotics (1.0%).

The QUAL analysis highlighted the presence of changes in the eating habits with these modifications being divergent. On the one hand, the participants expressed a greater consumption of fresh, closer, and healthier foods. This was justified, in part, by the greater availability of time for cooking:

“Fresh fish was consumed... this is good.” CH_10299

“I think that healthier, but we must take into account that we had more time for cooking.” CH_229

And on the other hand, the participants increased food consumption between meals:

“I ate more between meals because I did not leave the house as much.” CH_231

Lastly, on the subject of activity and physical exercise, this habit was promoted as a coping strategy against the negative emotions and feelings that surged during the COVID-19 pandemic:

“Young people started doing physical exercise because we were bored.” CP_213

“In general, people started to go out to walk for leisure, and this habit was maintained.” CP_214

3.4. Sources of Information. As for sources of information, as shown in Table 5, the source that was most utilized for obtaining information about the pandemic was the television, more specifically the news or specific documentaries about the subject (43.2%). However, the source of information they considered to be more trustworthy was health professionals, according to more than 70% of the sample studied. Nevertheless, only 35% of the participants utilized the source of information they considered to be more reliable.

In addition, the QUAL findings detected the emergence of the perception that the population was informed, although excessively, causing saturation:

“I’m sorry, but personally, I’m saturated with respect to COVID-19.” CI_120120

“Every day, when I woke up, the media was talking about COVID-19. The information about it was important, but it was excessive...” BI_14

Also, the way the information was transmitted led to difficulties in its interpretation, as it was considered as always changing, incoherent, and lacking in personalization according to age groups and overly sensationalist. On many occasions, this resulted in emotions such as fear:

“They changed the information they provided very often!” CI_114

“...I couldn’t leave the house from midnight to six in the morning. So, does the virus come out at night?” BI_12

“The information given was the same, both for young people and for older people. ...And the information aimed at youth had to have a motivating purpose.” BI_8

“On television, they showed images that were too sensationalists...” CI_186

“The images shown created fear.” CI_189

3.5. Vaccination. As for their state of vaccination (Table 6), 93.8% of the participants was vaccinated, and of these, 66.4% with the third dose. The reasons for becoming vaccinated, from highest to lowest percentage, were as follows: because they believed in science and the vaccines as a prevention method (75.3%), to attain herd immunity (47.2%), because they wanted the pandemic to end (46.2%), to be able to travel and for leisure activities (12.1%), due to social pressure (7.2%), and others such as because they were health professionals or being in contact with at-risk individuals (3.6%). Also, 12.1% believed that the vaccine had some negative effect on their health, with alterations in the menstrual cycle being identified as the most prevalent (50.3%). Of those who were not vaccinated (6.2%), the most common reasons were as follows: they did not trust vaccines (42.7%), because of the risk of adverse reactions due to which the vaccines were greater than the risk of becoming infected (42.7%), and because they had created them too fast (36.5%).

The QUAL data corroborated the ambivalent feelings about vaccination. On the one hand, herd immunity and protection were recognized, and the benefits that the vaccination provided in social life:

“We who are vaccinated increasingly weaken the virus.” BV_21

On the other hand, the vaccines have also created a lack of trust in two levels: one at the economic level and two in relation to the possible adverse effects:

“Of course, it’s all about business!” BV_19

“Little has been said about the secondary effects of the vaccine.” CV_128

3.6. Emotions Generated and Coping Strategies. With respect to the feelings and emotions generated during the pandemic (Table 7), uncertainty was identified by 47.8% of the participants, followed by fear of the situation (41.8%), sadness (38%), and distress (30.1%), among others. Some of these feelings and/or emotions were identified by 69.5% of the sample, and most identified aspects helped them to manage them (99.1%), such as to talk to their family (38.9%) or their circle of friends (33.1%). However, 52.9% of them still had some of the feelings or emotions described above. As for how they adapted to the new situation provoked by the

TABLE 5: During the pandemic, where did you get the most information about COVID-19 from, and which do you think is the most reliable source?

Source of information	Where did you obtain most of the information?		Most reliable source	
	Number (<i>n</i>)	Frequency (%)	Number (<i>n</i>)	Frequency (%)
Social networks (i.e. Instagram, Facebook, and Twitter)	158	10.1	16	1.0
TV: news programs or specific documentaries	674	43.2	223	14.3
TV: dissemination programs	109	7.0	34	2.2
Newspapers or magazines	42	2.7	24	1.5
Health professionals	313	20.1	1119	71.8
Internet	153	9.8	45	2.9
WhatsApp group	16	1.0	5	0.3
Family and friends	47	3.0	17	1.1
Others	47	3.0	76	4.9

TABLE 6: State of vaccination.

		Number (<i>n</i>)	Frequency (%)
Participants vaccinated		1463	93.8
Vaccine dose	1 dose	65	4.5
	2 doses	426	29.1
	3 doses	972	66.4
Reason for vaccination*	To believe in science and the vaccines as a prevention method	1101	75.3
	To want the pandemic to end	676	46.2
	To attain herd immunity	691	47.2
	Due to social pressure	106	7.2
	To be able to travel and for leisure activities	177	12.1
	Others	53	3.6
Negative health effect	Yes	177	12.1
	No	1017	69.5
	Does not know/does not answer	269	18.4
Why did you have a negative effect?*	Because I am more tired	55	31.1
	Because I have a headache or migraines	37	20.9
	Because I have had dermatological alterations	23	13.0
	Because my menstrual cycle has been altered	89	50.3
	Others	53	29.9
Nonvaccinated participants		96	6.2
Reason for nonvaccination*	Due to fear	7	7.3
	Lack of trust on the vaccine	41	42.7
	Due to its fast creation	35	36.5
	For fear of needles or shots	2	2.1
	Because of the risk of adverse reactions due to the vaccines was greater than the risk of becoming infected	41	42.7
	Because I think that if I follow a healthy lifestyle, it is enough	22	22.9
	Others	32	33.3

*Question with a multiresponse option.

COVID-19 pandemic, they maintained an optimist or positive attitude (62.3%), social contact (respecting the safety measures) (58.9%), and healthy habits (food, physical activity, and rest) (49.8%), and they also dosed the information on COVID-19 received (49.6%), among others. Lastly, as for the question of if they believed the pandemic, apart from the catastrophe, had contributed something positive, almost 60% said that it had help to put a spotlight on the work of health professionals.

According to the qualitative data, the experiences and the management of the disease could be classified into three categories: the emotions experienced by the participants, their consequences on them, and the techniques utilized to deal with the different situations. With respect to the emotions experienced, the focus group participants classified these emotions as negative as they caused fear, distress, feeling of being unprotected, or uncertainty, although at the same time, they were protective elements:

TABLE 7: Emotions generated and coping strategies.

		Number (n)	Frequency (%)
Have you felt any of these feelings or emotions during the pandemic: fear, distress, insomnia, stress, anxiety, uncertainty...?	Yes	1083	69.5
	No	476	30.5
What feelings or emotions were generated by COVID-19?* (n = 1083)	Fear of the situation	652	41.8
	Fear of going outside	226	14.5
	Distress	470	30.1
	Sadness	592	38.0
	Anxiety	439	28.2
	Insomnia	264	16.9
	Stress	423	27.1
	Uncertainty	745	47.8
	Others	358	23.0
Did you use personal tools to cope with them? (n = 1083)	Yes	1073	99.1
	No	486	0.9
More specifically, what helped you manage these feelings or emotions?* (n = 1083)	Talking to their circle of friends	516	33.1
	Talking to their family	607	38.9
	Talking to health professionals	256	16.4
	Writing	61	3.9
	Practicing some sports	306	19.6
Presently, do you still have some of these feelings or emotions? (n = 1083)	Others	153	9.8
	Yes	573	52.9
	No	444	41.0
	Does not know/does not answer	66	6.1
How did you adapt to the new pandemic situation provoked by COVID-19?*	Dosing the information on COVID-19 received	774	49.6
	Maintaining the social contact (respecting the safety measures)	919	58.9
	Maintaining healthy habits (food, physical activity, and rest)	776	49.8
	Keeping the mind occupied to not think about the pandemic	445	28.5
	Maintaining an optimist or positive attitude	972	62.3
	Seeking help if needed	180	11.5
	Others	44	2.8
	In general, do you believe that the pandemic, apart from the catastrophe, has contributed with some positive lessons?*	A greater group feeling	417
Better help in the neighborhood		367	23.5
To help to put a spotlight on the work of health professionals		921	59.1
To learn the management of health resources		318	20.4
To be less dependent on primary health care centers		272	17.4
None of the above (assess it negatively)		237	15.2
	Others	169	10.8

*Question with a multiresponse option.

“At the beginning, everyone was afraid, and the measures were extreme.” CP_185

“There was a lot distress, especially for going outside.” BP_51

“The feeling we had was as if we had been left unprotected!” BP_53

“We didn’t know when it would end. Now we are returning to the normal situation, but it is not known if it will last...” CP_191

In a parallel manner, they were able to determine the creation of cooperation as an element of social construction or value:

“The young people, such as us, took the shopping to the elderly, with the help from City Council.” CP_160

“We helped each other.” BP_65

Also, the participants observed experiences during the pandemic in the rural areas that were of higher quality as compared to the cities, due to the type of housing, low-density settlements, life closer to nature (vegetable gardens, fields), and a type of life that was more personal and human:

“I believe that we were privileged during the pandemic, since we lived in a rural area.” BP_36

“The confinement during the month of March was not experienced in the same way as in Lleida or Barcelona. It was very different. Here we were confined, but we were not distressed.” CP_155

The consequences of COVID-19 at the psychological level were characterized by changes in mood during the pandemic, the loss of social relations and loved ones, and a different view of the pandemic according to the different age groups, as well as the before and after marked by COVID-19 in the life of the participants:

“Now we are more relaxed than in the beginning.” CP_200

“Many relationships have been lost. . .” CP_192

“I missed my grandchildren and not being able to see my daughters.” CP_190

“The children, youth, and elders were the age groups that noted the negative consequences of COVID-19 more strongly than the rest, as they were confined at home” CP_208

“COVID-19 has changed everyone’s lives.” BP_52

“It will be hard for us to return to being as before.” CP_203

And lastly, the participants utilized tools such as in-house activities (cook, home improvement, and so on) and social activities from home (drinking vermouth, video-calls), to deal with the emotional situation in which they found themselves in:

“To disconnect from work at the hospital, I began to improve my house.” BP_70

“...each Sunday, we would drink vermouth from the balcony at home, and City Council would play music from the speakers.” CP_161

4. Discussion

The present study has allowed the identification of the knowledge and behaviors related with preventive measures, lifestyle habits, sources of information, vaccination, and the emotions generated and their coping strategies, as well as the

exploration of the personal experiences with respect to the knowledge, the attitudes, and the practices against COVID-19. Its mixed design has re-enforced the findings obtained, resulting in more profound and detailed knowledge [20]. This is a fundamental aspect for the design of HE interventions, as it must create learning experiences to help develop general skills that are transferable to health [21]. Good knowledge about health allows us to acquire health-promotion behaviors and to act against the challenges posed by COVID-19 [22] or in other possible health situations.

The profile of the QUAN study participants was women older than 50 years with a university degree, in agreement with other recent studies with online questionnaires during the COVID-19 pandemic [23, 24]. However, in the QUAL part, both sexes were equally represented, with a minimal predominance of men and with participants with a low level of education. This could be due to the rural nature of the places where the two focus groups took place. Given the dates and the time in the day of the focus groups (February and in the afternoon), a greater availability could be implied for the male group, as most were farmers, without any other employment obligations.

As for the knowledge of preventive measures against COVID-19, it was shown that they had a good general knowledge, especially related to the 3Ws (wear a mask, wash your hands, and watch your distance). Nevertheless, when specific questions were asked, it was found that they lacked in-depth and specific knowledge about them. One of the most recognized measures was related with the use of the face mask. Also, in our area, the general population had not used it until the arrival of the COVID-19 pandemic. In this sense, the awareness about the use of face masks was more present than other preventive measures [25], perhaps because they produce a false sense of protection, although the mandatory character of their use could have had an influence.

As for hand-washing, only one out of four participants knew that it was necessary to dry one’s hands for it to be effective. However, the need for information about the relative efficacy of different drying methods and if drying one’s hands completely could have spread SARS-CoV-2 had already been identified [26]. For this reason, the messages from public health authorities should have given the same importance to drying as washing, given the potential for cross-infection, as shown by a recent review on the subject [27]. As for the frequency and the times of hand-washing, the daily mean of hand hygiene events was 12.1 (± 10.0), and only 21.1% did so when needed, with these results very similar to other authors [28]. Another aspect that should be highlighted was the lack of knowledge about the efficacy of the hydroalcoholic solution in the prevention of infection and propagation of COVID-19, as compared to water and soap. However, since the outbreak of the disease, its use has increased considerably, and also, the population is more aware about the importance of hand-washing [29].

In general, the lifestyles of the participants were healthy, given that they met the physical activity and diet recommendations [30]. On the other hand, the multiple benefits for mental and physical health of physical activity during the

pandemic must be indicated, considering elements such as age, clinical conditions, and level of physical shape [31]. It has been demonstrated that the pandemic contributed towards the maintenance of healthy and active lives, as well as the consumption of fresh foods from nearby areas. Nevertheless, the intake of food during the pandemic was highly influenced by economic factors. Vulnerable individuals experienced food insecurity, which led to the buying of cheap and less healthy foods, such as packaged and ultra-processed foods [32]. In agreement with other authors [33], this study has shown that some individuals negatively modified their consumption habits in stressful situations, for example, snacking between meals.

The source from which they obtained more information was the television, specifically news programs or specific documentaries about the subject. However, the source of information they considered to be more reliable was health professionals. This is a very positive aspect given that it has been shown that those who trust health professionals with COVID-19 information tend to better adhere to preventive measures [34]. Another aspect that should be highlighted is their perception about an excess of information, which resulted in saturation and the possibility of receiving erroneous or hard-to-interpret information. In this sense, the Director-General of the WHO qualified the situation of disinformation about COVID-19 as an "infodemia" (that is, epidemic of disinformation or pandemic of disinformation), full of conspiracy theories, propaganda, and nonverified scientific statements with respect to the diagnosis, treatment, and prevention of the disease [35]. Therefore, the levels of digital health literacy of the population are also key for the preparation against future infodemias [36], as a low health literacy rate has been shown to result in practices and attitudes that compromise the health of individuals and also the rest of the population due to the proliferation of false information (misinfodemic) [37]. Therefore, it is necessary to consider that eHealth literacy could play an important role in promoting better prevention and control of infections [36]. Nevertheless, despite the messenger (author/source of information) being a fast and reliable indicator of information, the general population must be prepared to evaluate the message (content of information), to improve their levels of health literacy, in light of future infodemias [38].

The vaccination rate of our study sample was high. Nevertheless, there are global variations on the acceptance of the vaccine between populations, although the reasons for vaccination and acceptance of the vaccine are similar. According to a recent systematic review [39], the low acceptance of the vaccine has been associated with low levels of education and awareness and inefficient governmental efforts and initiatives. For this reason, investing in health literacy improves the acceptance of the vaccine and the making of health-related decisions, to reduce the impact of the COVID-19 pandemic [40]. On the other hand, the most prevalent secondary effect was alterations to the menstrual cycle. Recent studies have shown these effects in the shape of premenstrual symptoms (greater fatigue, abdominal distension, irritability, sadness or depression, headaches, and greater difficulty for falling sleep), as well as menstrual

changes (higher flows and stronger menstrual pain and shortening of the menstrual cycle) [41, 42].

Some authors [43, 44] corroborate the psychological impact from COVID-19 and the possible negative results for mental health, such as distress, anxiety, and fear, among others. However, the present study did not find more severe states such as depression, suicidal thoughts, or posttraumatic stress disorder (PTSD) [44]. On the one hand, the reasons could be explained with the findings in our focal groups, where it was confirmed that the rural environment seemed to be a protecting factor contrary to the urban areas, which are more complex due to their higher density, and the decreased possibility of maintaining isolation and physical distancing [45]. And, on the other hand, due to the equilibrium between the people who had feelings and/or emotions that could lead to mental health problems (69.5%), and those who used personal tools to cope with them (99.1%). It must be noted that worry or situational anxiety has positive effects, as they lead to preventive behaviors; although if these are persistent, they can result in mental health problems [46]. Also, our results are in agreement with other researchers [47]; when they indicated that people adapted to the guidelines according to the period in the pandemic, they sought ways to compensate for social distancing with other activities (in or outside the home) and other ways to communicate, such as online, or doubling measures of safety (ensuring protection by being outdoors and maintaining distance). In addition, this study shows the cooperation and solidarity during the COVID pandemic at interpersonal levels, by helping the most vulnerable (help nursing homes, older adults, and so on) or vaccinating to attain herd immunity. Lastly, it must be mentioned that the situation of the unprecedented pandemic, the uncertainty, and the risk to become infected are peritraumatic factors that are associated with psychopathology [43]. It is for this reason that 52.9% of the participants still had harbored some of the feelings or emotions mentioned above, without being able to manage them or without being able to find a useful tool to deal with them. Therefore, it is necessary to activate measures organized and centered on the person and based on strategies of active coping, acceptance, and positive thinking, to avoid avoidance strategies to obtain engaged coping that can lead to greater well-being [48].

Lastly, the comprehensive study (QUAN and QUAL) of the participants in a particular context allowed us to identify key elements of detection of needs. In this stage examined (two years after the start of the COVID-19 pandemic), key aspects can be inferred about the promotion, education, and health literacy [49]: more resources must be provided to improve community health, it is necessary to provide continuous training in health aspects to the population, and specific strategies must be established so that the population understand the information and act in a manner that is healthy. Also, HE implies the ability to evaluate the information and making decisions to promote protective behaviors [50], but this must be adapted to the context. For this, starting with the results found, it can be specified that (1) the pandemic has sensitized the population, and it is now aware of the importance of individual actions for the common good, for this is a key moment to act; (2) re-enforce the training on basic preventive measures against infectious diseases to achieve

behavioral changes that are more integrated and permanent in the population, into day-to-day actions such as hand-washing or the use of protective elements; (3) the information must be integrated as a communicative process and adapted to current channels and the use of technologies; (4) the postpandemic stage has left after-effects in the population at the physical and psychological levels, which must be continuously monitored and addressed, and (5) the lessons learned during the pandemic must help to create a “normality” that is impregnated of the social values that have emerged, such as equity, solidarity, and collectivity. In this sense, the results underline some determining factors of health literacy, but more studies are necessary to understand the impact and the evaluation of health literacy [51]. Nevertheless, the results can serve as the basis for the design of HE interventions, which can act as a modifying factor in health, and have a direct and fast impact on the population [22].

4.1. Limitations. Social bias limitations could exist in the data, as the participants could have provided socially desirable responses in relation to the preventive measures. Also, it must be considered that the study was conducted during the postpandemic period (2022), when the experience of the pandemic was still strong, but mediated by the current health situation (vaccinated population and so on). In addition, there could be a bias in the collection of QUAN data online due to Internet access availability. Lastly, the participation in the focus groups was voluntary, and there could therefore be a selection bias, although a broad invitation was performed through the city councils. Nevertheless, the multimethod combination utilized in the present study considerably minimizes these effects.

5. Conclusions

This study has allowed the identification of the knowledge and behaviors, as well as the exploration of the personal experiences related with the knowledge, the attitudes, and the practices two years after the start of the pandemic. The results showed that prevention measures must be reinforced, especially hand-washing, although its importance has already been recognized. However, the use of the face masks is well integrated, and their continued use is expected against respiratory pathologies. Lifestyles remained healthy, through the use of physical exercise as a source of well-being. The population trusted the information from health professionals, but it is excess due to the media, resulted in saturation and negative thoughts. Herd immunity and protection was recognized in vaccination, and although a psychological impact was found in the participants, it was cushioned with the activation of positive coping measures. Nevertheless, more than half of them still maintained it after two years. They must therefore be addressed for the maintenance of mental health.

5.1. Implications for Nursing Management. The role of nursing in the management of the COVID-19 pandemic was fundamental. However, studies were not found that

performed an in-depth analysis of the knowledge, attitudes, and practices of the population during this time. In this sense, this study allowed the detection of the current needs of the population, with an in-depth analysis of the object of study through the use of a mixed methodology approach. It provides the information needed by nursing personnel to be able to design an intervention adapted to the real needs of the population and to promote HE programs to address COVID-19 or other health situations. Therefore, the present study provides meaningful practical information that could be the starting point for other researchers, nurses and nurse managers and could be used to promote behaviors that favor the health of the general population.

Data Availability

The participants of this study did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research, supporting data are not available.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Supplementary material has been provided. Table 1 is a detailed summary of the QUAL themes, categories/sub-categories, and units of meaning of the findings from the present study. (*Supplementary Materials*)

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Research Article

Latent Classes of Personality Traits and Their Relationship with Workplace Bullying among Acute and Critical Care Nurses

Meng Sun ¹, Jing Han,² Ying Qiao,¹ Juan Wang,³ Mei Jiang,⁴ and Min Zhang ⁵

¹Department of Emergency Intensive Care Unit, Qilu Hospital of Shandong University, Jinan, Shandong Province, China

²Department of Endocrinology and Metabolism, Qilu Hospital of Shandong University, Jinan, Shandong Province, China

³Mental Health Center, Hangzhou Seventh People's Hospital, School of Brain Science and Brain Medicine, Zhejiang University School of Medicine, Hangzhou, Zhejiang, China

⁴Department of Emergency, Qilu Hospital of Shandong University, Jinan, Shandong Province, China

⁵Department of Nursing Department, Qilu Hospital of Shandong University, Jinan, Shandong Province, China

Correspondence should be addressed to Min Zhang; laohuang302@sina.com

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Objective. To identify the latent classes of personality traits among nurses in acute and critical care departments, as well as the relationship between latent classes of different personality traits and workplace bullying. **Methods.** A total of 245 nurses working in the acute and critical care department at a 3 A-grade hospital in Shandong Province, China, were recruited by convenient sampling. The Chinese Big Five Personality Inventory brief version was used to assess personality traits, and the Negative Acts Questionnaire was used to measure workplace bullying. Latent profile analysis was used to identify the latent classes of personality traits. Multiple linear regression analysis was used to examine the relationship between latent classes of personality traits and workplace bullying. **Results.** Four latent classes of personality traits among acute and critical care nurses were identified, namely, the negative group (49.0%), flexible group (16.0%), neurotic group (18.1%), and stable group (16.9%), respectively. Compared with the neurotic group, the negative group ($B = -6.227, P < 0.05$), stable group ($B = -16.562, P < 0.001$), and flexible group ($B = -19.208, P < 0.001$) experienced less workplace bullying. **Conclusion.** Our findings explore latent classes of personality traits among acute and critical care nurses, identify subgroups susceptible to workplace bullying, and suggest the development of appropriate interventions to reduce workplace bullying. **Implications for Nursing Management.** Hospital managers can identify nurses who are prone to workplace bullying based on their personality traits and provide them with psychological counseling services and psychological healing groups to help them establish good interpersonal relationships and maintain their mental and physical health.

1. Introduction

Workplace bullying, as a workplace stressor, refers to the negative behaviors of work-related harassment, offense, and exclusion that an individual frequently and repeatedly experiences in the workplace for more than six months (at least once a week) [1]. Research has shown that workplace bullying is more common and severe for nurses than other professions [2], especially for acute and critical care nurses who work in the emergency room and intensive care unit [3]. Workplace bullying not only has adverse effects on the physical and mental health of nurses [4], but also causes job burnout [5], increases the turnover tendency of nurses [6],

and even affects the quality of nursing care and threatens the life safety of patients [6]. Therefore, more attention should be paid to identifying risk factors for workplace bullying among acute and critical care nurses.

Personality traits refer to the stable and unique psychological and behavioral patterns that distinguish oneself from others and are shaped under the combined action of congenital heredity and acquired environmental conditions. Previous studies have shown that personality traits, as a typical variable reflecting individual differences, play a significant role in predicting individuals' exposure to workplace bullying [7–9]. For example, Balducci et al. [10] found that neuroticism was positively correlated with

workplace bullying among 609 public sector employees in Italy. However, most studies focus on the relationship between a certain personality trait (e.g., neuroticism and agreeableness) and workplace bullying from a variable-centered perspective and neglect that different types of personality traits can exist simultaneously.

Latent profile analysis (LPA) [11] is a person-centered statistical analysis identifying different subgroups within populations that share certain outward characteristics. LPA can be used to analyze the relationship between personality traits and workplace bullying when taking different types of personality traits into consideration simultaneously. Studies have shown that individuals with the same level of personality traits show different characteristics in different dimensions [12, 13]. However, the relationship between the latent classes of personality traits and workplace bullying remains underinvestigated.

Therefore, this study aimed to apply LPA to explore different potential classes of personality traits of acute and critical care nurses and to analyze their relationship with workplace bullying.

2. Materials and Methods

2.1. Study Participants. From April to September 2022, a total of 245 acute and critical care nurses in a 3 A-grade hospital in Shandong Province were selected as participants by the convenience sampling method. The inclusion criteria for acute and critical care nurses were as follows: (1) registered nurse with valid license; (2) working in the acute and critical care departments for more than 3 months (three months is a probation period); and (3) informed consent and voluntary participation. The exclusion criteria were: not having been employed as a nurse in this hospital.

2.2. Procedures. In this study, the online questionnaire collection was carried out through the “Wenjuanxing” platform with the support of the consent of the nursing department and head nurses of all departments in the hospital. The study followed the principles of voluntary participation and informed consent with the ethics approval number 2020-R-061. Before completing the questionnaire, the objective and procedure of the questionnaire were detailed. Finally, 245 valid questionnaires were collected.

2.3. Study Tools

2.3.1. Sociodemographic Characteristics. Personal characteristics include sex, age, level of education, and marital status; job-related characteristics include average monthly income, employment relationship, professional title, working years, night shift involvement, number of monthly night shifts, and weekly working hours.

2.3.2. Chinese Big Five Personality Inventory Brief Version (CBF-PI-B). The CBF-PI-B [14] was used to assess personality traits by acute and critical care nurses. It comprises 40 items and can be classified into 5 dimensions (i.e.,

neuroticism, extroversion, openness, agreeableness, and conscientiousness). Each item was rated on a 5-point scale, with a point from 1 to 5 indicating “strongly disagree” to “strongly agree.” The higher the total score of each dimension is, the more obvious the corresponding personality characteristics are. Cronbach’s alpha of the total scale in this study was 0.878.

2.3.3. Negative Acts Questionnaire (NAQ). The NAQ was developed by Einarsen and Notelaers [15] and was translated into Chinese by Hongjing Xun [16] in 2012. It has been widely used in the measurement of workplace bullying suffered by Chinese nurses. The NAQ has 22 items and includes 3 dimensions (i.e., individual-related negative acts, work-related negative acts, and organizational injustice). A 5-point scale was used to rate each item, with a point from 1 to 5 indicating “never,” “occasionally,” “monthly,” “weekly,” and “daily,” respectively. The higher the total score is, the higher the level of workplace bullying nurses experience. Cronbach’s alpha of the total scale in this study was 0.980.

2.4. Statistical Methods. Firstly, for continuous variables conforming to a normal distribution, mean and standard deviation (SD) were used for description; for non-normal distribution data, median and interquartile range (IQR) were used for description; for categorical variables, frequency and percentage were used for description.

Secondly, LPA was conducted to identify latent profiles of personality traits. We started with a one-profile model and gradually increased the number of profiles until the optimal model was identified. The model was comprehensively evaluated according to Entropy, Bootstrap likelihood ratio test (BLRT), Lo–Mendell–Rubin adjusted likelihood ratio test (LMR), Akaike information criteria (AIC), Bayesian information criteria (BIC), sample-size-adjusted Bayesian information criterion (aBIC). The smaller the AIC, BIC, and aBIC values are, the better the fitting degree is. Entropy ranges from 0 to 1, with higher values (value ≥ 0.8) indicating a clearer classification [17]. When the results of LMR and BLRT are < 0.05 , it indicates that the K class model is superior to K-1 class model [18].

Thirdly, the chi-square test was used to analyze socio-demographic differences of potential personality traits among nurses in acute and critical care units.

Fourthly, the Kruskal–Wallis test was used to explore the relationship between the latent classes of personality traits of nurses and workplace bullying.

Fifthly, the Wilcoxon–Mann–Whitney test and Kruskal–Wallis test were used to analyze the differences in workplace bullying among acute and critical care nurses with different sociodemographic characteristics.

Finally, multiple linear regression was conducted to analyze the relationship between latent profiles of personality traits and workplace bullying, and statistically significant demographic variables in the univariate analysis were controlled as covariates. The significance level was set at $\alpha = 0.05$ (two sides). SPSS 25.0 and Mplus 8.0 were used for statistical analyses.

3. Results

3.1. Latent Profiles of Personality Traits among Acute and Critical Care Nurses. As shown in Table 1, six models were obtained by fitting from one to six latent classes, respectively. The entropy values of the 2-class to 6-class models were >0.8 , indicating good accuracy of these models. As the number of latent classes increased, AIC, BIC, and aBIC gradually decreased. In the model of Class 4, the P values of both LMR and BLRT were significant; indicating that the model of Class 4 was superior to the model of Class 3, but the P value of LMR of the model of Class 5 was nonsignificant. Therefore, the model of Class 4 was determined as the optimal model.

To verify the reliability of the analysis results of the above latent classes, the average posterior probability of different models is shown in Table 2. The results showed that the average posterior probability (column) of the four latent classes (row) of nurses' personality traits ranged from 0.786 to 0.954, indicating that the model fitting results of the four latent classes were reliable.

The first class (49.0%) called the "C1 negative group" scored higher on the neurotic dimension than the C2 flexible group and the C4 stable group but lower than the C3 neurotic group and the lowest on the dimensions of conscientiousness, agreeableness, openness, and extroversion. The second class (16.0%) had the lowest score on the dimension of neuroticism and the highest score on other dimensions and was named as "C2 flexible group." The third class (18.1%) had the highest score on the dimension of neuroticism, moderate scores on the dimensions of conscientiousness, agreeableness, openness, and extroversion, and was named as "C3 neurotic group." The final class (16.9%) had low scores in neuroticism, openness, and extroversion and high scores in conscientiousness and agreeableness, indicating conservative personality and stable mood, and was labeled as "C4 stable group" (Figure 1).

3.2. The Differences in Sociodemographic Characteristics of Nurses in Different Latent Classes of Personality Traits. Univariate analysis results showed that there were statistically significant differences ($P < 0.05$) in age, professional title, and monthly night shift number of nurses in different latent classes of personality traits (Table 3). Flexible group were older than neurotic group nurses. Compared with acute and critical care nurses of high professional titles, those with low professional titles accounted for a higher proportion in negative group and neurotic group. Compared with those without night shifts, acute and critical care nurses with night shifts accounted for a higher proportion in negative group and neurotic group.

3.3. Relationship between Latent Classes of Personality Traits and Workplace Bullying among Acute and Critical Care Nurses

3.3.1. Disparity between Latent Classes of Personality Traits and Workplace Bullying among Acute and Critical Care

Nurses. As shown in Table 4, the dimensions and total scores of workplace bullying showed significant differences in the latent classes of personality traits among acute and critical care nurses ($P < 0.001$). Post hoc analysis showed that the C1 negative group and the C3 neurotic group scored higher than the flexible group and stable group in the two dimensions of individual-related negative acts and work-related negative acts and the total score of negative acts. In the dimension of organizational injustice, the neurotic group scored higher than the flexible group and the stable group, and the negative group scored higher than the flexible group.

3.3.2. Wilcoxon–Mann–Whitney Test and Kruskal–Wallis Test Were Used to Analyze the Differences in Workplace Bullying among Acute and Critical Care Nurses with Different Sociodemographic Characteristics. The normality test of workplace bullying suffered by nurses showed a skewed distribution. Therefore, the Wilcoxon–Mann–Whitney test and Kruskal–Wallis test were used to analyze the relationship between sociodemographic characteristics and workplace bullying. The results showed that age, marital status, weekly working hours, and average monthly income of participating nurses correlated with workplace bullying significantly ($P < 0.05$).

3.3.3. Multiple Linear Regression Was Conducted to Analyze the Relationship between Latent Profiles of Personality Traits and Workplace Bullying. Multiple linear regression analysis showed that after controlling for age, marital status, weekly working hours, and average monthly income, compared with the neurotic group, the negative group ($B = -6.227$, $P < 0.05$), stable group ($B = -16.562$, $P < 0.001$), and flexible type ($B = -19.208$, $P < 0.001$) reported lower levels of workplace bullying (Table 5).

4. Discussion

This study found four heterogeneous groups of personality traits among acute and critical care nurses, including negative, neurotic, flexible, and stable groups. The stable group (16.9%) was introverted but rigorous, got along well with others, and had stable emotions. The flexible group (16.0%) was rigorous, extroverted, highly tolerant and empathetic to others, and able to handle interpersonal relations flexibly. Although the stable and flexible groups had been identified in previous studies [12, 13], this study still proposed two new groups of personality traits, namely, negative group and neurotic group. The negative group (49.0%) was introverted, indifferent to others with low social participation, and may show a negative attitude at work. The neurotic group (18.1%) was overly sensitive, lowly tolerant to others, prone to anxiety, and had an unstable personality. The reason may be related to the job content of emergency and critical care departments. Acute and critical care nurses face and rescue more critically ill patients with more workload, working time, work pressure, and night shifts, which may induce negative attitudes and negative emotions [19, 20], so there are the negative group and neurotic group.

TABLE 1: Latent profile analysis of personality traits among acute and critical care nurses.

Model	Loglikelihood	AIC	BIC	aBIC	Entropy	LMR	BLRT
1	-3858.521	7737.043	7772.055	7740.356
2	-3693.684	7419.369	7475.389	7424.670	0.847	0.0005	0.0000
3	-3652.435	7348.870	7425.897	7356.159	0.814	0.2567	0.0000
4	-3619.410	7294.819	7392.854	7304.097	0.815	0.0458	0.0000
5	-3590.718	7249.436	7368.479	7260.701	0.815	0.3042	0.0000
6	-3570.915	7221.830	7361.880	7235.083	0.837	0.2648	0.0000

Note. AIC: Akaike information criteria, BIC: Bayesian information criteria, aBIC: sample-size-adjusted Bayesian information criterion, LMR: Lo-Mendell-Rubin adjusted likelihood ratio test, BLRT: bootstrap likelihood ratio test.

In this study, there were significant differences in age, professional title, and number of monthly night shifts among latent classes of personality traits. Flexible group nurses were older than neurotic group nurses. Compared with acute and critical care nurses of high professional titles, those with low professional titles accounted for a higher proportion in the negative group and neurotic group. Compared with those without night shifts, acute and critical care nurses with night shifts accounted for a higher proportion in the negative group and neurotic group, which was consistent with the results of previous studies [12]. It is worth noting that the negative group and neurotic group were prone to anxiety, depression, and other negative emotions [21] and more likely to have career burnout [12]. Consistently, this study revealed that the negative group and the neurotic group exhibited higher overall scores of workplace bullying when compared to both the flexible group and the stable group, indicating a greater susceptibility to workplace bullying. Therefore, nursing managers should pay more attention to negative and neurotic nurses.

Multiple linear regression results showed that compared with the neurotic group, the negative, stable, and flexible groups all suffered from less workplace bullying considering nurses' sociodemographic characteristics and working hours as the potential confounders. This was consistent with the results of previous studies that personality traits are closely related to workplace bullying [9, 22]. This study found that nurses prone to workplace bullying did not have a single personality trait but a personality type composed of several personality traits. Individuals with low neuroticism, high conscientiousness, high agreeableness, high extroversion, and high openness and individuals with low neuroticism, high conscientiousness, high agreeableness, low extroversion, and low openness were not prone to workplace bullying [23]. According to the Victim Precipitation Theory [24], certain characteristics or behaviors exhibited by people may become their weaknesses, attract others' encroachment, and make them the targets to be hurt. Acute and critical care nurses in the neurotic group are emotionally unstable, difficult to get along with others and easy to be isolated by colleagues, and become the target of bullying. Nurses in both the flexible group and stable group are introverted or extroverted and can maintain a responsible and rigorous attitude with less negative emotions and better deal with interpersonal relationships; hence, they are less likely to be bullied by colleagues [25].

TABLE 2: Average posterior probability of latent classes of personality traits in acute and critical care nurses.

Latent Class	1	2	3	4
1	0.954	0	0.02	0.027
2	0	0.943	0.042	0.015
3	0.092	0.017	0.855	0.036
4	0.133	0.03	0.051	0.786

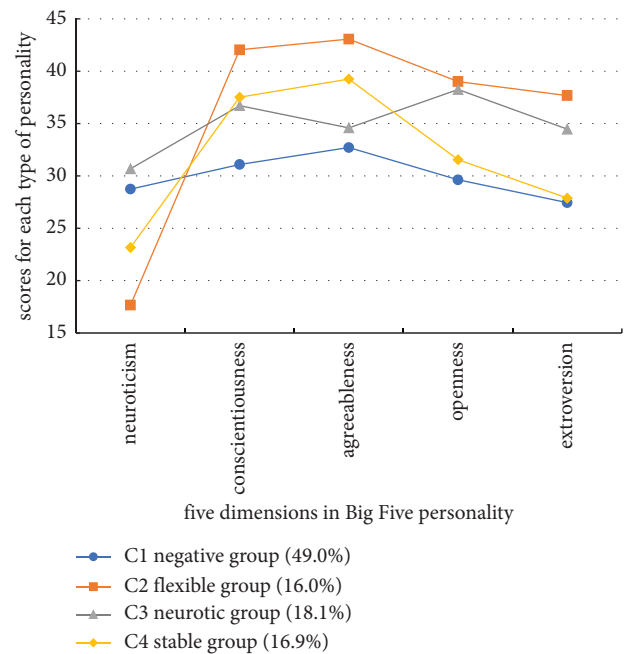


FIGURE 1: Latent classes of personality traits in acute and critical care nurses.

5. Limitations

There are several limitations of the present study. Firstly, using a cross-sectional design, this study could not predict the longitudinal trajectory of nurses' exposure to workplace bullying, nor could it draw a causal relationship between potential categories of personality and workplace bullying, which needs to be confirmed by more empirical studies in the future. Secondly, the representativeness of the existing study participants is limited. This study only surveyed nurses in the emergency critical care department of a 3 A-grade hospital, and the sample size was small. Third, confounding factors such as

TABLE 3: Distribution comparison of latent classes of personality traits among acute and critical care nurses with different demographic characteristics (n (%)).

Variables	C1 negative group	C2 flexible group	C3 neurotic group	C4 Stable group	F/χ^2 value	P value
<i>General demographic characteristics</i>						
Age (year)	30.26 ± 4.776	31.90 ± 5.816	28.59 ± 4.495	30.45 ± 5.187	3.082	0.028
Sex					7.012	0.072
Male	27 (49.1%)	6 (10.9%)	16 (29.1%)	6 (10.9%)		
Female	97 (51.1%)	33 (17.4%)	28 (14.7%)	32 (16.8%)		
Marital status					5.494	0.139
Married	77 (50.3%)	30 (19.6%)	23 (15.0%)	23 (15.0%)		
Other	47 (51.1%)	9 (9.8%)	21 (22.8%)	15 (16.3%)		
Level of education					6.256	0.066
Bachelor degree or below	118 (50.6%)	34 (14.6%)	43 (18.5%)	38 (16.3%)		
Master degree or above	6 (50.0%)	5 (41.7%)	1 (8.3%)	0 (0.0%)		
Average monthly income (RMB)					13.629	0.118
<4000	5 (38.5%)	2 (15.4%)	2 (15.4%)	4 (30.8%)		
4000–8000	41 (50.6%)	12 (14.8%)	17 (21.0%)	11 (13.6%)		
8000–10000	50 (61.7%)	7 (8.6%)	13 (16.0%)	11 (13.6%)		
>10000	28 (40.0%)	18 (25.7%)	12 (17.1%)	12 (17.1%)		
<i>Work-related characteristics</i>						
Working years					6.142	0.407
≤5	45 (48.4%)	11 (11.8%)	23 (24.7%)	14 (15.1%)		
6–10	46 (50.5%)	16 (17.6%)	14 (15.4%)	15 (16.5%)		
≥11	33 (54.1%)	12 (19.7%)	7 (11.5%)	9 (14.8%)		
Employment form					5.415	0.132
Tenure and personnel agency	10 (35.7%)	8 (28.6%)	4 (14.3%)	6 (21.4%)		
Contract and labor dispatch	114 (52.5%)	31 (14.3%)	40 (18.4%)	32 (14.7%)		
Professional title					13.137	0.041
Nurse	27 (47.4%)	4 (7.0%)	17 (29.8%)	9 (15.8%)		
Senior nurse	70 (53.8%)	21 (16.2%)	21 (16.2%)	18 (13.8%)		
Chief nurse	27 (46.6%)	14 (24.1%)	6 (10.3%)	11 (19.0%)		
Weekly working hours					7.454	0.281
≤40	35 (42.7%)	15 (18.3%)	14 (17.1%)	18 (22.0%)		
41–45	66 (56.4%)	15 (12.8%)	20 (17.1%)	16 (13.7%)		
≥46	23 (50.0%)	9 (19.6%)	10 (21.7%)	4 (8.7%)		
Number of monthly night shifts					34.357	<0.001
None	10 (28.6%)	13 (37.1%)	3 (8.6%)	9 (25.7%)		
1–9	45 (57.7%)	17 (21.8%)	8 (10.3%)	8 (10.3%)		
≥10	69 (52.3%)	9 (6.8%)	33 (25.0%)	21 (15.9%)		

Note. P -values in bold are statistically significant for an alpha of 0.05.

TABLE 4: Disparity between latent classes of personality traits and workplace bullying among acute and critical care nurses.

Variables	C1	C2	C3	C4	H value	Comparison
Individual-related negative acts	15 (11, 20.5)	9 (9, 12)	15.5 (11, 28)	11 (9, 14.25)	38.256***	C1 > C2, C4 C3 > C2, C4
Work-related negative acts	16 (12, 21)	10 (9, 12)	15.5 (12, 26)	11 (10, 14.25)	50.095***	C1 > C2, C4 C3 > C2, C4
Organizational injustice	8 (7, 11)	6 (4, 8)	9 (6.25, 14)	7.5 (5, 9)	24.720***	C1 > C2 C3 > C2, C4
Scores of negative acts	39 (31, 53.5)	24 (23, 33)	41.5 (31, 68.75)	32 (24, 36.25)	41.077***	C1 > C2, C4 C3 > C2, C4

Note. *** P < 0.001; C1: negative group; C2: flexible group; C3: neurotic group; C4: stable group.

TABLE 5: Relationship between latent classes of personality traits and workplace bullying among acute and critical care nurses.

Variables	<i>B</i>	SE	<i>t</i>	<i>P</i> value	95% CI
Classes of psychological violence					
Neurotic group	Reference group				
Negative group	-6.523	3.156	-2.067	0.040	(-12.741, -0.305)
Stable group	-16.051	4.015	-3.998	<0.001	(-23.961, -8.142)
Flexible group	-18.907	4.011	-4.713	<0.001	(-26.810, -11.004)
Age	0.167	0.324	0.516	0.607	(-0.472, -0.806)
Marital status					
Married	Reference group				
Others	-1.650	3.111	-0.530	0.569	(-7.779, 4.480)
Weekly working hours					
<40	Reference group				
41-45	3.456	2.660	1.299	0.195	(-1.784, 8.697)
≥46	3.463	3.431	1.009	0.314	(-3.296, 10.223)
Average monthly income (RMB)					
<4000	Reference group				
4000-8000	1.765	5.383	0.328	0.743	(-8.839, 12.370)
8000-10000	7.539	5.667	1.330	0.185	(-3.627, 18.705)
>10000	4.283	5.811	0.737	0.462	(-7.166, 15.732)

Note. *P*-values in bold are statistically significant for an alpha of 0.05.

working environment, organizational problems and other factors may not be fully taken into account in this study; it is suggested that more comprehensive confounding factors should be included in future studies for analysis.

6. Conclusion

There are four subtypes of personality traits among acute and critical care nurses: the negative group, flexible group, neurotic group, and stable group. Nurses in the neurotic group are more likely to suffer from workplace bullying. It is necessary to identify the personality traits of nurses and develop interventions to reduce workplace bullying.

7. Implications for Nursing Management

There are several implications for nursing management. First, hospital managers should pay attention to neurotic and negative nurses who are prone to workplace bullying. Although their personality characteristics are stable and not easy to change, managers should take active and effective measures to help them, such as setting up psychological counseling departments and psychological healing teams in the department to help nurses who have been bullied get rid of the adverse effects. Guide them to build good interpersonal relationships and maintain their mental and physical health. Second, hospital managers can help nurses to understand and cope with workplace bullying by organizing training related to workplace bullying, and carry out targeted training for nurses with different personality characteristics and different ages, so as to improve the awareness and handling ability of nurses. Third, department leaders can form a positive nursing work atmosphere by organizing team building activities or constructing department culture. At the same time, they can set a team work mode, comprehensively consider the characteristics of nurses, work ability, and other factors to assign team members, form a mutual help and harmonious group work atmosphere, and increase the ability to resist workplace

bullying. In addition, hospital managers can take the potential characteristics of nurses' personality traits as a reference index for the selection of nursing talents and the allocation of departments, assign nurses with different personalities to suitable departments, and select nursing talents more suitable for emergency and critical department posts [26].

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

Prior to the study, the research protocol was approved by the Ethics Review Board of Shandong University School of Nursing and Rehabilitation (2020-R-061).

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Meng Sun conceptualized and design the study, performed analysis, wrote the manuscript, and revised the manuscript. Jing Han contributed to interpretation of data and revised the manuscript. Ying Qiao performed data collection. Juan Wang proposed the methodology. Mei Jiang performed data collection. Min Zhang provided project administration, provided resources, performed supervision, contributed to validation, and wrote, reviewed, and edited the article. All the authors have approved the final draft.

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Research Article

Levels and Predictors of Leaders' Humble Leadership, Participants' Psychological Safety, Knowledge Sharing in the Team, and Followers' Creativity in Nursing: A Cross-Sectional Online Survey

Majd T. Mrayyan  and Saleem F. Al-Rjoub 

Department of Community and Mental Health Nursing, Faculty of Nursing, The Hashemite University, P.O. Box 330127, Zarqa 13133, Jordan

Correspondence should be addressed to Majd T. Mrayyan; mmrayyan@hu.edu.jo

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Aim. The current study investigated the levels and predictors of leaders' humble leadership, participants' psychological safety, knowledge sharing in the team, and followers' creativity in nursing. **Background.** Humble leadership, psychological safety, knowledge sharing, and followers' creativity are non-nursing research fields, and humble leadership has recently been examined in nursing. **Methods.** A cross-sectional research design was employed via an online survey. A nonprobability convenience snowball sample of 245 nursing academics ($n = 85$, 34.70%), nurses ($n = 140$, 57.10%), and nursing leaders ($n = 20$, 8.20%) was recruited from three universities and three hospitals. **Results.** The participants rated "high" the leaders' humble leadership, knowledge sharing in the team, and followers' creativity in nursing. However, participants' psychological safety was precarious. The four variables' predictors were assessed based on the sample's characteristics. Leaders' humble leadership did not predict participants' psychological safety; the sole predictor of the variable was the organization's quality initiatives. The predictors of knowledge sharing in the team were leaders' humble leadership, age, level of education, and accreditation initiatives in the organizations. The predictors of followers' creativity were leaders' humble leadership, level of education, and quality initiatives in the organizations. The lowest means of the four variables should be immediately managed. **Conclusion.** Quality initiatives in organizations and the number of tenures were the most influential predictors of the four variables evaluated. Leaders' humble leadership predicted knowledge sharing in the team and followers' creativity, but not participants' psychological safety. As followers' psychological safety contributes to trustful relationships within the team, workplace boundaries and conducive work environments should be promoted. Training programs are required to develop humble nurses and leaders' leadership.

1. Background

Despite the developments in nursing leadership research, humble leadership continues to have certain evident disadvantages [1, 2]. Social information processing theory provides the theoretical basis for understanding how humble leadership influences followers' creativity [3]. This theory suggests that followers rely on information cues to understand their work environments and regulate their behaviors [3, 4]. Leaders are the key information sources, given

their higher status and direct involvement and interactions with followers [5, 6].

Today's healthcare environment faces many challenges that include but are not limited to development and innovations, meeting international requirements and competition, and developing new leadership approaches, such as humble leadership [7].

This leadership style is a new concept that has gained more attention in nursing leadership research as the term originates originally in psychology research [6, 7]. Humble

leadership, also called humility, is a top-down leadership style that focuses on leaders' openness about their developmental processes, including willingness to view themselves accurately, being open to feedback and creative ideas, and learning by doing [6–8]. This style is needed in nursing because nursing leadership has vital roles in healthcare services at all levels [7]. Nursing humble leaders have to create conducive work environments that promote nurses' engagement, creativity, and innovation [7] and, in turn, achieve different healthcare outcomes, particularly patient satisfaction and the quality of nursing care. An example of these outcomes is missed care or rationed care, which is a highly prevalent clinical healthcare problem resulting in many consequences that negatively influence patients, nurses, and healthcare organizations [9]. Organizations that have quality initiatives have more humble leaders [10], who are expected to solve efficiently the complicated issue of missed care by employing different interventions such as appropriate staffing levels, supplying enough resources, mutual communication and feedback, and teamwork [11].

Psychology-related variables include humble leadership, psychological safety, knowledge sharing, and followers' creativity. Traditional leadership is no longer appropriate because it is difficult for today's leaders to figure everything out at the top due to the increasingly chaotic healthcare work environment [6, 8]. In the quickly changing work environment, nurses' creativity and vigilant leaders have become a mandate [12, 13]. Nevertheless, the growth of creativity is not an instantaneous process; it necessitates an environment of psychological security and the exchange of knowledge to thrive [13, 14].

Being open to new ideas and criticism, valuing the abilities and contributions of others, and seeing oneself honestly are all interpersonal traits of *humble leadership* [15, 16]. Leadership researchers have only recently begun to empirically investigate the impact of leaders' humble leadership on followers' attitudes, such as job satisfaction and job engagement [16], psychological empowerment [6, 13, 15], and nurses' innovative behaviors [15, 17]. A humble leader's behavioral modeling A leader's humble approach can foster a mentally secure setting, potentially shaping a psychologically safe environment [15, 17], which, in turn, may inspire followers to engage in creative behaviors [6, 15].

Psychological safety is the perception of the consequences when taking interpersonal risks in work environments [6, 15]. For followers to be creative, a sense of safety is required [6, 10]. Humble leadership significantly impacts psychological safety [6, 14, 15]. Humble leaders accept their shortcomings and errors in public and see mistakes as a valuable part of the learning process [15, 18]. Such behaviors provide critical information to followers, allowing them to feel psychologically comfortable expressing themselves and taking interpersonal risks to realize their full potential, which also applies to nursing professionals. This is especially true when followers of humble leaders form remarkable leader-follower relationships [15, 16] as it lowers perceived risks and strengthens the safety climate [6, 15].

In addition, humble leaders constantly seek feedback and are open to new ideas [15]. This communicates to followers that speaking up and expressing novel ideas are acceptable and even expected [6, 15]. Humble nursing leaders appreciate their team members' talents and efforts [10] and foster a psychologically safe environment [19] by valuing and encouraging their ideas and opinions [6, 14]. As a result, the followers (nurses) feel free to express themselves and work without fear of negative consequences [6, 19].

Organizations must be creative to perform well, survive, and succeed [20, 21]. The value of creativity has boosted research interest in uncovering traits that lead to creativity during the last few decades [6]. Most of these studies emphasized the positive benefits of leadership styles, such as authentic, transformational, servant, empowering, and sharing, which can positively influence followers' (nurses') creativity [6, 21].

Creativity is inherently riddled with obstacles, uncertainties, and risks because new ideas cannot be guaranteed to produce the desired results [22]. In addition, leaders may not always support or accept new ideas from followers [6, 23]. As a result, a work environment that supports interpersonal risk-taking and expressing novel ideas is critical for motivating followers' creativity; it can even increase one's propensity to do so [6, 24]. Individuals are more likely to express new ideas and take risks in a safe environment, which helps them overcome their anxiety and fear of failure [6, 25].

The psychological safety of the followers has influenced their creativity [6, 14]. However, research on the connection between psychological safety and creativity has yielded contradictory results [6]. Surprisingly, psychological safety does not always result in creativity [6, 26]. As a result, the relationship between psychological safety and creativity is more complicated than anticipated [6, 27]. According to inconsistent empirical findings, boundary variables permit or inhibit the favorable impacts of psychological safety on creativity [6, 28]. However, regardless of the contradictory findings, a psychologically safe environment fosters intergroup trust [13], allowing followers to engage in risky creative activities [6, 14, 25]. Knowledge sharing is crucial for participants' psychological safety [14, 25] and creativity and motivation [12, 28]. The absence of cognitive capacity among followers hinders the generation and presentation of creative ideas [6, 29].

Knowledge sharing is essential for followers' creativity [6, 14]. Knowledge sharing allows followers to gain cognitive resources such as ideas, knowledge, and information, improve cognitive capabilities, and inspire creativity [6, 12, 14].

Research problem: due to the constantly changing work environment, today's leaders find it difficult to grasp humble leadership at the top [15, 18]. Top-down leadership has gone out of step with the times [30]. Despite calls for humble leadership, many unknowns exist regarding how it works in organizations, including healthcare and nursing [6, 18, 19].

As a result of their leaders' higher status and frequent interactions with their teams, followers often learn important information from their leaders' comments and behaviors, allowing them to alter their perspectives of work

settings and respond in the desired way [6, 31]. When humble leaders recognize and manage their flaws and errors, value their followers' strengths and contributions, and display teachability, followers may feel psychologically safe to speak and share new ideas [18, 32]. In response, the perception of a safe work environment may enhance followers' creativity [6, 33].

Theoretical background: despite the importance of humble leadership, there is a significant gap in knowing how humble leadership works in organizations [6, 18]. Consistent with Wang et al. [6] and Elhadidy and Gao [3], "social information processing" theory was adopted in this study. That is, leaders should give up the concept of the "great man," be transparent about their knowledge and experience limitations, and pay closer attention to the influence of followers on leader's performance. As a result, this study investigated how humble leadership influences followers' creativity.

The social information processing theory focuses on how individuals use environmental information to build and interpret events in the workplace [3, 4]. Followers seek information from their leaders to shape their perceptions of the work environments [6, 34]. They act as per the situational attractiveness of specific activities [6]. We assume that humble leaders admit their faults and shortcomings, demonstrate teachability, and value the abilities and contributions of their followers [18, 19]. Followers will feel psychologically comfortable to express fresh thoughts in this circumstance [6, 33]. As a result, followers' creativity would be encouraged if they perceived a safe work environment [6, 33]. According to social information processing theory, psychological safety contributes favorably to modest leadership and followers' creativity [3].

Purpose and significance: nursing research on humble leadership, psychological safety, knowledge sharing in the team, and followers' creativity is lacking. Like many other countries, Jordan is experiencing volatile work situations; hence, such a study is timely.

This is a large-scale project in which the current study answered the following research questions: (1) what are the levels of leaders' humble leadership, participants' psychological safety, knowledge sharing in the team, and followers' creativity in nursing? (2) What are the predictors of leaders' humble leadership, participants' psychological safety, knowledge sharing in the team, and followers' creativity in nursing based on the subjects' characteristics? (3) Do the leaders' humble leadership and the subjects' characteristics predict participants' psychological safety, knowledge sharing in the team, and followers' creativity in nursing?

Only one psychology-based study studied humble leadership, psychological safety, knowledge sharing, and followers' creativity together [6]. Our study is the first international and national study about the four concepts in nursing. Some studies exist about some concepts but were not conducted in nursing [35] or had limited concepts in nursing studies, such as leaders' humble leadership and nurses' psychological safety [19].

The outcomes of the current study will be used to develop leadership training for nurses and other professionals.

Nursing leaders should create supportive work environments to encourage followers' psychological safety and cultivate trusting relationships with their leaders and other experts. Leaders should share knowledge to help their team members achieve psychological safety because it has been demonstrated to reduce the impact of participants' psychological safety on their creativity. Organizations that foster psychological safety and knowledge-sharing circumstances should see high levels of followers' creativity.

2. Methods

2.1. Research Design and Sampling Technique. An online survey was used with a cross-sectional design. A non-probability convenience snowball sample of 245 nursing academics ($n = 85$, 34.70%), nurses ($n = 140$, 57.10%), and nursing leaders ($n = 20$, 8.20%) who worked in three universities and three hospitals were collected, with a response rate of 70.00%. Facebook and WhatsApp were used to collect responses from participants for the online survey. The principal investigator started collecting data by recruiting convenience samples through which the study was announced, and participants were selected if they wished to participate. Other participants were referred to the researcher through snowball recruitment.

The sample size in this study was determined by the formula of $N \geq 10(k) + 50$, where N is the sample size and k is the number of independent variables (four major variables and 12 subjects' characteristics); the minimum sample size should be 210 participants [36], however, 245 participants were obtained. The ability to use electronic platforms and being employed in universities or hospital settings were the sample inclusion criteria.

2.2. Ethical Considerations. The university's Institutional Review Board (IRB), where the current authors work, approved the study; the reference number is 11/8/2021/2022, dated July 25, 2022. Participants were informed in the invitation letter that they might decline to complete the online survey if desired and that their participation constituted their consent. The researchers stored a password on participants' coded responses in Google Drive; all participant data were anonymous. Confidentiality was assured by sharing the aggregate results with nursing leaders in the designated universities and hospitals.

2.3. Data Collection Procedures. Data were gathered in 2022 using a self-report survey administered online in English using Google Forms. The online survey was set to allow for one submission only and by using cookies. It was validated through a small pilot study to check that it was functional and appropriate for the Jordanian setting; no changes were required. The first researcher shared the survey link on the Facebook pages of the Faculty of Nursing and the first researcher's colleagues. To ensure that the target population of nursing academics, nurses, and nursing leaders was targeted, filtering questions were used at the beginning of the survey. The participants were encouraged to invite their contacts.

Data were collected across ten days, and participants were reminded to complete the survey only once after five days with a reminder e-mail. As a result, the online survey was built in this manner.

2.4. Research Instruments: Variables and their Operational Definitions. The subjects' characteristics measured in the current study were gender, marital status, age, time commitment, level of education, and work area if the organization of work is being accredited or if they have official quality initiatives (yes vs. no), tenure (a tenured is someone who has worked for an organization for several years), team size, type of sector, and title.

Following the methodology of Wang et al. [6], the English-version tools were used to collect data and piloted before the actual data collection; no adjustments were required. These research instruments are commonly used in psychology because they have high psychometric measures. Humble leadership, psychological safety, knowledge sharing, and creativity were continuous variables. All tool is a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Thus, a score above 3 to 5 was considered high; around three was considered edgy or borderline, and below three was low.

2.4.1. Humble Leadership. The nine-item scale developed by Owens et al. [16] was used to measure leaders' humble leadership. "This leader often compliments others strength" is an example of an item. The original instrument has content and incremental validity that differentiate it from other positive leadership styles, such as servant, transformational, and ethical leadership [2]. The Cronbach's alpha for this instrument was 0.88 [6] and 0.93 in the current study.

2.4.2. Psychological Safety. The seven-item scale Edmondson [37] developed was used to measure participants' psychological safety. "It is difficult to ask other team members of the organization for help" is an example. The original instrument has discriminant validity [37]. The Cronbach's alpha for this tool was 0.76 [6] and 0.71 in the current study.

2.4.3. Knowledge Sharing. The seven-item scale developed by Lee [38] was used to measure knowledge sharing in the team. "Organizational members share each other's success and failure stories" is an example of an item. The original instrument was reported to have predictive validity [39]. The Cronbach's alpha for this instrument was 0.78 [6] and 0.93 in the current study.

2.4.4. Creativity. The 12-item self-rated creativity scale (SRCS) was modified [40] and used to measure followers' (nursing academics, nurses, and nursing leaders) creativity. "I come up with new and practical ideas to improve performance" is an example. The SRCS was created to evaluate

employees' creativity [40]. The original instrument was reported to have convergent, discriminant, and concurrent validities [40]. The SRCS had internal consistency, as indicated by the Cronbach's alpha of 0.84 [41] and 0.94 in the current study.

2.5. Data Analyses. The Statistical Package for the Social Sciences (SPSS) version 25 [42] calculated descriptive statistics as means, standard deviations, or frequencies and percentages at an alpha of 0.05. Data were visually checked for normality and outliers by drawing a histogram and checking for extreme standard deviations. There were no missing data as the online survey was set to answer all questions.

For the current study, humble leadership and subjects' characteristics were treated as independent variables, while psychological safety, knowledge sharing, and followers' creativity were the dependent variables.

The general linear model (GLM) was used to assess predictors of leaders' humble leadership, participants' psychological safety, knowledge sharing in the team, and followers' creativity based on subjects' characteristics [36]. Another GLM was run while assigning leaders' humble leadership and subjects' characteristics as independent variables, and participants' psychological safety, knowledge sharing in the team, and followers' creativity as dependent variables [36].

Following previous research [6], this study includes several control variables. The first researcher controlled gender, age, the number of tenures (the duration a person holds a job or title), and team size at the organization. Followers' gender, age, and team size were considered because they relate to followers' creativity [6].

3. Results

The majority of the sample was married females, nursing academics, or nurses or nursing leaders, young to middle-aged with baccalaureate degrees, and full-time nurses or academics; these governmental work settings were mostly accredited and had quality initiatives. The participants reported that they were tenured for ten years or more (above average tenure; the average is commonly four years) and worked in a large team with more than fifteen members (the ideal collaborative team size is 4–8) (Table 1).

3.1. Levels of Leaders' Humble Leadership. For the whole sample and a five-point Likert scale, the participants rated highly (agreed) the leaders' humble leadership (mean = 3.57; SD = 0.87). The highest mean of leaders' humble leadership was that the leader was open to the ideas of others (mean = 3.72; SD = 1.06) and showed appreciation for the unique contributions of others (mean = 3.71; SD = 1.06). The lowest mean of leaders' humble leadership was that they admitted when they did not know how to do something (mean = 3.28; SD = 1.14) (Table 2).

3.2. Levels of Participants' Psychological Safety. For the whole sample and a five-point Likert scale, the participants' psychological safety was on the border (mean = 3.09; SD = 0.64). The highest mean of participants' psychological safety was that they felt their unique skills and talents were valued and utilized when working with team members (mean = 3.49; SD = 0.98). The lowest mean of participants' psychological safety was having difficulty asking others for help (mean = 2.71; SD = 1.15) (Table 3).

3.3. Levels of Knowledge Sharing in the Team. For the whole sample and a five-point Likert scale, the participants rated high (agreed) knowledge sharing in the team (mean = 3.48; SD = 0.80). The highest mean was related to the implicit knowledge sharing related to service providers sharing "know-how" from work experience with each other (mean = 3.60; SD = 0.88). The lowest means were related to the explicit knowledge sharing related to service providers sharing each other's success and failure stories (mean = 3.42; SD = 1.01) and business knowledge obtained from different sources (mean = 3.42; SD = 1.01) (Table 4).

3.4. Levels of Followers' Creativity. For the whole sample and a five-point Likert scale, the participants rated high (agreed) followers' creativity within the team (mean = 3.75; SD = 0.63). The highest mean of followers' creativity was that they suggested new ways to increase the quality of work (mean = 3.90; SD = 0.92). The lowest mean of followers' creativity was that they were not afraid to take risks (mean = 3.59; SD = 0.95) (Table 5).

3.5. Significant Predictors of Leaders' Humble Leadership, Participants' Psychological Safety, Knowledge Sharing in the Team, and Followers' Creativity Based on the Subject's Characteristics. The GLM was used to assess predictors of the studied variables based on the subject's characteristics [36].

The predictors of leaders' humble leadership were marital status (t -test = -2.75; p value = 0.006) and the number of tenures (t -test = 1.26; p value = 0.010). The model was significant (F -test = 16.88; DF = 12; p value = 0.001; adjusted R^2 = 0.037) and explained 3.7% of the variance in the mean score of leaders' humble leadership.

The predictor of participants' psychological safety was only the quality initiatives in the organizations (t -test = -2.37; p value = 0.018). The model was significant (F -test = 18.78; DF = 12; p value = 0.001; adjusted R^2 = 0.012) and explained 1.2% of the variance in the mean score of participants' psychological safety.

The predictors of knowledge sharing in the team were marital status (t -test = -2.87; p value = 0.004), the accreditation initiatives in the organizations (t -test = -2.79; p value = 0.006), the quality initiatives in the organizations (t -test = -2.22; p value = 0.027), and the number of tenures (t -test = 2.39; p value = 0.018). The model was significant (F -test = 16.74; DF = 12; p value = 0.001; adjusted R^2 = 0.103) and explained 10.3% of the variance in the team's mean score of knowledge sharing in the team.

TABLE 1: Subject's characteristics (N = 245).

Characteristics	*N (%)
<i>Gender</i>	
Male	76 (31.00)
Female	169 (69.00)
<i>Marital status</i>	
Single	88 (35.90)
Married	145 (59.20)
Separated or widowed	12 (4.90)
<i>Age</i>	
Less than 25 years	56 (22.90)
25–34 years	56 (22.90)
35–44 years	85 (34.70)
45–54 years	36 (14.70)
55 years or more	12 (4.90)
<i>Time commitment</i>	
Full-time work	208 (84.90)
Part-time work	37 (15.10)
<i>Level of education</i>	
Diploma (2 years college degree)	19 (7.80)
Baccalaureate	127 (51.80)
Master	58 (23.70)
Doctorate	41 (16.70)
<i>Role</i>	
Nursing academics	85 (34.70)
Nurses	140 (57.10)
Nursing leaders	20 (8.20)
<i>Work area</i>	
Faculty	57 (23.30)
Units	124 (50.60)
Wards	64 (26.10)
<i>Accreditation initiatives in organizations</i>	
Yes	219 (89.40)
No	26 (10.60)
<i>Quality initiatives in organizations</i>	
Yes	214 (87.30)
No	31 (12.70)
<i>Number of tenures in work</i>	
Less than one year	61 (24.90)
1–2 years	20 (8.20)
3–4 years	35 (14.30)
5–9 years	25 (10.20)
10 years or more	104 (42.40)
<i>Team size in work</i>	
1–5 members	63 (25.70)
6–10 members	37 (15.10)
7–15 members	42 (17.10)
More than 15 members	103 (42.00)
<i>The sector of work</i>	
Governmental	188 (76.70)
Private	57 (23.30)

*N, sample size.

The predictors of followers' creativity were the level of education (t -test = 2.70; p value = 0.007), the quality initiatives in the organizations (t -test = -3.93; p value = 0.001), and the number of tenures (t -test = 2.20; p value = 0.029). The model was significant (F -test = 11.69; DF = 12; p value = 0.001, adjusted R^2 = 0.133) and explained 13.3% of the variance in the mean score of followers' creativity (Table 6).

TABLE 2: Levels of leaders' humble leadership (N = 245).

Items	Mean (SD*)	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
This leader actively seeks feedback, even if it is critical	3.62 (1.13)	20 (8.20)	19 (7.80)	44 (18.00)	114 (46.50)	48 (19.60)
This leader admits it when they do not know how to do something	3.28 (1.14)	19 (7.80)	44 (18.00)	66 (26.90)	81 (33.10)	35 (14.30)
This leader acknowledges when others have more knowledge and skills than themselves	3.45 (1.13)	16 (6.50)	35 (14.30)	59 (24.10)	92 (37.60)	43 (17.60)
This leader takes notice of others' strengths	3.69 (1.04)	13 (5.30)	18 (7.30)	52 (21.20)	112 (45.70)	50 (20.40)
This leader often compliments others on their strengths	3.56 (1.06)	13 (5.30)	22 (9.00)	70 (28.60)	94 (38.40)	46 (18.80)
This leader shows appreciation for the unique contributions of others	3.71 (1.06)	15 (6.10)	16 (6.50)	47 (19.20)	114 (46.50)	53 (21.60)
This leader shows a willingness to learn from others	3.51 (1.13)	16 (6.50)	30 (12.20)	60 (24.50)	90 (36.70)	49 (20.00)
This leader shows that they are open to the advice of others	3.67 (1.07)	13 (5.30)	20 (8.20)	57 (23.30)	101 (41.20)	54 (22.00)
This leader shows that they are open to the ideas of others	3.72 (1.06)	14 (5.70)	14 (5.70)	56 (22.90)	103 (42.00)	58 (23.70)
Total mean score	3.57 (0.87)					

This 9-item scale is rated from 1 (strongly disagree) to 5 (strongly agree). *SD = standard deviation.

TABLE 3: Levels of psychological safety (N = 245).

Items	Mean (SD*)	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
If you make a mistake on this team, it is often held against you	3.10 (1.05)	14 (5.70)	63 (25.70)	74 (30.20)	73 (29.80)	21 (8.60)
Members of this team can bring up problems and tough issues	3.24 (1.09)	17 (6.90)	49 (20.00)	62 (25.30)	93 (38.00)	24 (9.80)
People on this team sometimes reject others for being different	3.03 (1.13)	25 (10.20)	60 (24.50)	62 (25.30)	79 (32.20)	19 (7.80)
It is safe to take a risk on this team	3.02 (1.02)	21 (8.60)	50 (20.40)	91 (37.10)	70 (28.60)	13 (5.30)
It is difficult to ask other team members for help	2.71 (1.15)	37 (15.10)	83 (33.90)	53 (21.60)	57 (23.30)	15 (6.10)
No one on this team would deliberately act in a way that undermined my efforts	3.07 (1.01)	11 (4.50)	64 (26.10)	85 (34.70)	66 (26.90)	19 (7.80)
By working with members of this team, my unique skills and talents are valued and utilized	3.49 (0.98)	11 (4.50)	26 (10.6)	70 (28.60)	109 (44.50)	29 (11.80)
Total mean score	3.09 (0.64)					

This 7-item scale is rated from 1 (strongly disagree) to 5 (strongly agree). *SD = standard deviation.

TABLE 4: Levels of knowledge sharing (N = 245).

Items	Mean (SD*)	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
Explicit knowledge sharing: we and our service provider share business proposals and reports with each other	3.50 (0.97)	11 (4.50)	25 (10.20)	66 (26.90)	116 (47.30)	27 (11.00)
We and our service provider share business manuals, models, and methodologies	3.44 (0.99)	12 (4.90)	29 (11.80)	67 (27.30)	112 (45.70)	25 (10.20)
We and our service provider share each other's success and failure stories	3.42 (1.01)	11 (4.50)	36 (14.70)	64 (26.10)	107 (43.70)	27 (11.00)
We and our service provider share business knowledge from newspapers, magazines, journals, and television	3.42 (0.99)	12 (4.90)	26 (10.60)	81 (33.10)	98 (40.00)	28 (11.40)
Implicit knowledge sharing: we and our service provider share know-how from work experience with each other	3.60 (0.88)	9 (3.70)	13 (5.30)	70 (28.60)	128 (52.20)	25 (10.20)
We and our service provider share each other's know-where and know-whom	3.48 (0.92)	8 (3.30)	27 (11.00)	72 (29.40)	116 (46.90)	23 (9.40)
We and our service provider share expertise obtained from education and training	3.55 (0.97)	11 (4.50)	24 (9.80)	58 (23.70)	123 (50.20)	29 (11.80)
Total mean score	3.48 (0.80)					

This 7-item scale rated from 1 (strongly disagree) to 5 (strongly agree). *SD = standard deviation.

TABLE 5: Levels of followers' creativity.

Items	Mean (SD*)	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
I suggest new ways to achieve goals or objectives	3.81 (0.90)	8 (3.30)	10 (4.10)	49 (20.00)	131 (53.50)	47 (19.20)
I come up with new and practical ideas to improve performance	3.78 (0.84)	6 (2.40)	11 (4.50)	51 (20.80)	139 (56.70)	38 (15.50)
I search for new technologies, processes, techniques, and/or product ideas	3.73 (0.95)	8 (3.30)	13 (5.30)	65 (26.50)	110 (44.90)	49 (20.00)
I suggest new ways to increase the quality of work	3.90 (0.92)	8 (3.30)	7 (2.90)	49 (20.00)	118 (48.20)	63 (25.70)
I am a good source of creative ideas	3.80 (0.87)	5 (2.00)	9 (3.70)	64 (26.10)	118 (48.20)	49 (20.00)
I am not afraid to take risks	3.59 (0.95)	8 (3.30)	22 (9.00)	67 (27.30)	113 (46.10)	35 (14.30)
I promote and champion ideas to others	3.77 (0.85)	6 (2.40)	9 (3.70)	61 (24.90)	128 (52.20)	41 (16.70)
I exhibit creativity in my work when allowed	3.76 (0.92)	9 (3.70)	9 (3.70)	59 (24.10)	122 (49.80)	46 (18.80)
I often have new and innovative ideas	3.72 (0.81)	7 (2.90)	7 (2.90)	63 (25.70)	139 (56.70)	29 (11.80)
I come up with creative solutions to problems	3.74 (0.85)	7 (2.90)	9 (3.70)	59 (24.10)	135 (55.10)	35 (14.30)
I often have a fresh approach to problems	3.70 (0.79)	6 (2.40)	6 (2.40)	70 (28.60)	136 (55.50)	27 (11.00)
I suggest new ways of performing work tasks	3.74 (0.89)	9 (3.70)	11 (4.50)	52 (21.20)	136 (55.50)	37 (15.10)
Total mean score	3.75 (0.63)					

This 12-item scale is rated from 1 (strongly disagree) to 5 (strongly agree). *SD = standard deviation.

TABLE 6: Significant predictors of leaders' humble leadership, participants' psychological safety, knowledge sharing in the team, and followers' creativity based on the subject's characteristics using GLM ($N = 245$).

Dependent and significant predictors	B^*	T -test	p value	R^2	Adjusted R^2	F -test (df) ** (p value)
The total score of humble leadership				0.085	0.037	16.88 (12) (0.001)
Marital status	-3.32	-2.75	0.006			
Number of tenures	3.27	1.26	0.010			
The total score of psychological safety				0.061	0.012	18.78 (12) (0.001)
Quality initiatives in organizations	-2.17	-2.37	0.018			
The total score of knowledge sharing				0.147	0.103	16.74 (12) (0.001)
Marital status	-2.41	-2.87	0.004			
Accreditation initiatives in organizations	-3.27	-2.79	0.006			
Quality initiatives in organizations	-2.44	-2.22	0.027			
Number of tenures	2.10	2.39	0.018			
The total score of followers' creativity				0.175	0.133	11.69 (12) (0.001)
Level of education	3.30	2.70	0.007			
Quality initiatives in organizations	-6.18	-3.93	0.001			
Number of tenures	2.77	2.20	0.029			

* B , unstandardized coefficients; ** $p < 0.001$ (2-tailed).

3.6. *Leaders' Humble Leadership and Subject's Characteristics as Predictors of Participants' Psychological Safety, Knowledge Sharing in the Team, and Followers' Creativity.* The GLM was performed while handling leaders' humble leadership and subjects' characteristics as independent variables, and participants' psychological safety, knowledge sharing in the team, and followers' creativity as dependent variables [36].

The results of the GLM indicated that the only predictor of participants' psychological safety was the quality initiatives in the organizations ($B = -2.16$; p value = 0.020). The model was significant ($F(df = 13) = 17.11$; p value = 0.001; $R^2 = 0.008$; Table 7), and it explained 0.80% of the variance in the mean score of participants' psychological safety.

The predictors of knowledge sharing in the team were leaders' humble leadership ($B = 8.16$; p value = 0.001), age ($B = 2.79$; p value = 0.006), level of education ($B = -1.99$; p value = 0.047), and the accreditation initiatives in the organizations ($B = -2.55$; p value = 0.011). The model was significant ($F(df = 13) = 5.51$; p value = 0.020; adjusted $R^2 = 0.301$; Table 7) and explained 30.10% of the variance in the team's mean score of knowledge sharing.

The predictors of followers' creativity were leaders' humble leadership ($B = 7.16$; p value = 0.001), level of education ($B = 2.78$; p value = 0.006), and the quality initiatives in the organizations ($B = -3.57$; p value = 0.001). The model was insignificant ($F(df = 13) = 3.15$; p value = 0.077; Table 7), but it explained 28.70% of the variance in the mean score of followers' creativity.

In conclusion, the most influential predictors of leaders' humble leadership, participants' psychological safety, knowledge sharing in the team, and followers' creativity were quality initiatives in the organizations and the number of tenures. Leaders' humble leadership predicted knowledge sharing in the team and followers' creativity, but not participants' psychological safety.

4. Discussion

The current study's subjects fit the demographics of nursing academics, nurses, nursing leaders, and organizational characteristics in Jordan.

According to the social information processing theory [3, 4], humble leadership influences followers' creativity when they are well-informed, and knowledge is shared among the team; this reflects positively in their understanding of their work environments and regulating their behaviors accordingly [3, 4]. However, the staff's need for self-monitoring and constant scanning of their work environments may explain why they have borderline psychological safety.

The high rating for humble leadership stems from the benefits of humble leadership, which pave the path for better listening and improved collaboration (supported by Anser et al. [43] and Kelemen et al. [15]). As former nurses, nursing leaders, and current academic professionals, we like to be led by a sympathetic leader.

The high rating for knowledge sharing emanated from knowledge being one of any organization's most valuable intangible assets. While corroborating the assertions mentioned above as former healthcare professionals and current academics, Al Hawamdeh [44] asserted that staff members have grown more receptive to knowledge help. Staff employees are more prepared to deal with unexpected events since they are more knowledgeable. Thus, the study participants were aware that knowledge would flow from top leadership to staff members through knowledge exchange in the team, thus setting the way for creating relevant or new knowledge in the organization.

Followers' creativity within the team received a higher rating because of the improved teamwork it delivers to an organization, which is consistent with the studies of

TABLE 7: Significant leaders' humble leadership and subject's characteristics as predictors of participants' psychological safety, knowledge sharing in the team, and followers' creativity using GLM ($N=245$).

Dependent and significant predictors	B^*	T -test	p value	R^2	Adjusted R^2	F -test (df) ** (p value)
The total score of psychological safety				0.061	0.008	17.11 (13) (0.001)
Quality initiatives in organizations	-2.16	-2.34	0.020			
The total score of knowledge sharing				0.338	0.301	5.51 (13) (0.020)
Leaders' humble leadership	0.329	8.16	0.001			
Age	2.33	2.79	0.006			
Level of education	-2.41	-1.99	0.047			
Accreditation initiatives in organizations	-2.66	-2.55	0.011			
The total score of followers' creativity				0.325	0.287	3.15 (13) (0.077)
Leaders' humble leadership	0.425	7.16	0.001			
Level of education	3.08	2.78	0.006			
Quality initiatives in organizations	-5.12	-3.57	0.001			

* B , unstandardized coefficients; ** $p < 0.001$ (2-tailed).

Mrayyan [10], Sengupta et al. [45], as well as Wang et al. [6]. Collaboration is widely encouraged in a creative environment. As a result, the participants realized they needed to foster a continuous learning attitude while encouraging employees to seek new information, knowledge, and better ways to complete their responsibilities.

However, despite all preceding positive indicators, participants' psychological safety was borderline; this may imply issues with inclusion in teams and organizations, as Singh [14] suggests. In Jordan, we suffer limited inclusion in teams and organizations. Psychological safety is about enabling openness, inclusion is necessary for mutual learning, and the latter is necessary to progress in a complex and ambiguous world [46]. This pioneer researcher in psychological safety attested to the strong link between psychological safety, learning, and performance in teams and organizations.

4.1. Leaders' Humble Leadership. The participants rated highly (agreed) the leaders' humble leadership. This point again humbles leadership to leaders' ability to recognize their strengths and weaknesses alongside limitations, similar to Cho et al. [47] and Kelemen et al. [15].

Our participants agreed that a humble leader can be more persuasive [48]; this is human nature. Humans frequently support the underdog while opposing their competitors or opponents. Humble leadership puts leaders in a better position to inspire their team or followers. Furthermore, nurse leaders may readily persuade their followers to collaborate to realize a healthcare vision. Humble leadership engenders trust, loyalty, and enthusiasm more effectively than fear and manipulation, which is in line with studies of Kelemen et al. [15].

Humble leaders are open to other people's ideas and show respect for their unique contributions. This was the polar reverse of popular stereotypes, calling for nurse leadership to command a room with high success and authority. Participants recognized the importance of adopting a more inclusive and inviting communication style. The participants were part of a nursing leadership that encouraged workers to discuss their ideas. Taking this option

provides high operational flexibility and considerable levels of employee involvement. In comparison to their competitors that embrace authoritarian techniques, such nursing organizations demonstrate strategic alignment and retention, as well as a high level of performance [13], which is supported by Kelemen et al. [15].

On the other hand, humble leaders did not admit when they did not know how to do something. This illustrates that one of the major characteristics of humble leadership is the willingness to be taught and directed in areas where they are either inexperienced or lack knowledge. This kind of admittance shows the nurses their leaders and also fix opinion as opinions, and it helps the team come up with the right solutions, as demonstrated by Zhou and Li [49].

Some nurses may have encountered something similar in past work contexts, possibly in other roles. As a result, they will provide vital insight into the next best action. As seen across leading healthcare organizations, the most significant successes will likely emerge from not knowing [49].

4.2. Participants' Psychological Safety. The participants rated their psychological safety on the border, contrary to Wang et al. [6] and similar to Mrayyan and Al-Rjoub [19]; this warrants vigilant leadership to intervene immediately. Psychologically safe staff members, on the other hand, were open to ideas that would eventually lead the way for new solutions, as demonstrated by O'donovan and McAuliffe [50]. Nursing organizations acknowledge the power of variety through psychological safety. As a result, the participants advocate for psychologically safer workplaces throughout their businesses, with nurses encouraged to suggest new and innovative solutions.

Participants' psychological safety was high when they felt their unique skills and talents were valued and utilized when working with team members. This could imply that nursing leadership can provide psychological safety to team members by exploiting their particular abilities and talents. This will demonstrate to them that their organizations value their abilities and capabilities. The findings align with Mansour and Tremblay [51], who claimed that when firms better utilize their employees' skills, they have a higher job

satisfaction. Nursing staff workers are more prepared to adjust to recommended future changes when they have psychological safety.

On the other hand, participants' psychological safety was low when they had trouble asking others for support. Taylor et al. [52] validated the findings, arguing that some professionals, even leaders, think that asking for help will expose them as inexperienced or incapable. The researchers reported that some nursing staff members think that such a request may be a process of losing control. In many organizations, such as ours, asking for help might put the staff member in a vulnerable position, where the majority may avoid seeming weak, which is similar to the study of Taylor et al. [52].

4.3. Knowledge Sharing in the Team. The participants rated high (agreed) knowledge sharing in the team. Knowledge sharing emerged as a crucial attribute of nursing leadership, as did humble leadership [6, 10, 14]. Confirming our findings with Holmgren et al. [53], the participants recognized the importance of knowledge sharing in increasing the collective skills of medical staff members. Understanding a patient's condition and making healthcare-related decisions demonstrate the capacity.

The highest level of implicit knowledge sharing was associated with service providers exchanging "know-how" from their job experiences with one another. This step is crucial in ensuring that the team connects and performs better [6, 54]. Similarly to our view, Holmgren et al. [53] suggested that sharing implicit knowledge of the experience commanded by other nurses helps them become more vital professionals. This allows the organization to save more training resources while still capturing and maintaining knowledge during turnover [53].

The least explicit information sharing occurred when service providers shared each other's success and failure tales and business expertise collected from various sources. Participants agreed that, similar to our professional experience, such a move was critical in cooperating and producing collective knowledge. Explicit knowledge sharing promotes improved ways of carrying out nursing duties while fostering a learning culture [53].

4.4. Followers' Creativity. The participants rated high (agreed) followers' creativity within the team. The participants were aware that creativity is a factor that inspires staff members to operate as a team, as attested by Kohnen et al. [34]. As a result of such a creative process, an organization fosters a collaborative culture. Thus, with a continuous learning mindset, staff members would continuously seek new information and expertise as well as better ways of doing things [43].

When followers offered new approaches to improve the quality of work, their creativity was high. Creativity encompasses increased quality and quantity production [43]. As mentioned, staff members realize this when seeking new information and knowledge, which is possible when they identify new ways to do their jobs, as previously said.

Participants were unafraid to take risks, indicating that creative individuals are risk-takers. Creative people are always ready to take "good" risks, which leads them down an inventive road [43]. Furthermore, they will take social risks to keep the team safe.

4.5. Significant Predictors of the Studied Concepts Based on the Subject's Characteristics. The predictors of leaders' humble leadership were marital status and the number of tenures, which is one of the novel results of the current study. The current findings are supported by Wang et al. [55], who reported that the antecedents of creativity in teams were leaders' gender, marital status, age, education, and tenure, which may also apply to our leaders' humble leadership. Being female and having more tenure years may signify having better job control and self-discipline, as mentioned by Al Hawamdeh [44]. Similar to our situation, the researcher reported that gender and tenure made a leader more caring while exhibiting high levels of self-control. As a result, the staff members were more focused on achieving personal goals and meeting organizational objectives.

The predictor of participants' psychological safety was only the quality initiatives in the organizations, which is also one of the novel results in the current study. As Jordan is experiencing quality initiatives in most clinical and academic settings, organizational quality initiatives promote our belief that the nursing team enjoys the safety necessary for interpersonal risk-taking. Quality initiatives are critical in creating a psychologically safe environment where people can speak up and express their views.

Marital status, accreditation initiatives in organizations, quality initiatives in organizations, and the number of tenures were predictors of knowledge sharing in the team, which is a novel finding. The four variables may contribute to our participants' trust in knowledge sharing. Being female and having tenure were antecedents of team creativity, supported by Wang et al. [55]. This may also apply to knowledge sharing in our teams in the current study. Chen et al. [1] complemented our findings about the effect of accreditation and quality initiatives in organizations on team knowledge sharing. The researchers asserted that staff members working in accredited organizations confidently share their knowledge. The same applies to the quality initiatives in organizations that always keep the staff members' input and output in check.

Of the novel results, the predictors of followers' creativity were the level of education, the quality initiatives in the organizations, and the number of tenures. This demonstrates that creative people are more educated and experienced. Besides, with quality initiatives in place, staff members would always seek new ways of doing things, similar to what is reported by Chen et al. [1].

4.6. Leaders' Humble Leadership and Subject's Characteristics as Predictors of the Studied Concepts. The only predictor of participants' psychological safety was the quality initiatives in the organizations. This result is in line with our participants' rating high (agreed) the leaders' humble leadership (similar to Mrayyan and Al-Rjoub [19] and Wang et al. [6]),

but not their psychological safety (similar to Li et al. [26] and Mrayyan and Al-Rjoub [19]).

Previous studies reported a mediational model of psychological safety in the relationship between leadership and followers' creativity to account for the inconsistent findings in the literature [6, 26]. Although Wang et al. [6] reported that psychological safety has a mediating role between leadership and followers' creativity, Li et al. [26] reported no evidence of psychological safety mediation.

Previous research supported the relationship between leaders' humble leadership and participants' psychological safety [6, 56]; however, our study revealed that leaders' humble leadership does not predict participants' psychological safety. As former nurses and current academics, we strongly believe the problem is a lack of workplace boundaries. As a result, humble leaders must establish boundaries necessary for participants' psychological safety. Boundaries in the workplace are guidelines that employees make for themselves to determine what is psychologically safe and permissible for others to do around them [57]. Since they did not care for their well-being, our participants did not believe their workplace boundaries were healthy. Their team relationships did not blossom or grow well. They lacked the trust and belonging required to participate in the team. Everyone wants to set boundaries and have those boundaries respected. Healthy workplace boundaries are promoted by healthy work environments and cultures [57]. On the other hand, unhealthy boundaries lead to disengagement, depression, stress, and anxiety, and, this in turn, results in stress-induced physical illness [57].

Leaders' humble leadership, age, education, and organization accreditation initiatives were predictors of knowledge sharing in the team, which were comparable to Wang et al. [6], who reported that humble leadership influences knowledge sharing. Knowledge sharing is a humble leadership-boundary factor to enhance followers' creativity [6, 58]. Our participants rated high their humble leaders and knowledge sharing in the team. When there is a high level of knowledge sharing in the team, followers will offer and share new ideas, which does not suddenly happen. According to Mrayyan [10] and Wang et al. [6], humility leadership is the defining factor in such a setting and humble leaders should encourage team members to offer new ideas.

Leaders' humble leadership, education, and organizational quality initiatives were predictors of followers' creativity. According to Elhadidy and Gao [3] and Wang et al. [6], humble leaders influence their followers' creativity. These humble leaders were receptive to other people's views and appreciated the distinctive contributions of others [18, 19]. Thus, these positive characteristics of humble leaders will influence followers' creativity.

Chaman et al. [12] explained the psychological mechanisms between leaders' humble leadership and followers' creativity through intrinsic motivation and social learning. Those studies, however, concentrated on the old top-down leadership [30], whereas humble leadership is a new bottom-up leadership style [8]. Humble leaders are essential for any organization; however, humble leadership has only recently begun [59]. Moreover, Wang et al. [6] critiqued these studies

for focusing just only on one level of analysis, either the individual level or the team level. This single level of analysis resulted in an incomplete picture of what humble leadership is, implying that humble leadership has cross-level effects, or what Li et al. [26] referred to as the "spillover" from "team-level humble leadership" to "individual-level humble leadership."

4.7. Limitations. When nurses reflect on their leaders' humble leadership, they focus solely on their strengths, creating a bias in rating humble leaders. Self-reporting of leaders' humble leadership, participants' psychological safety, knowledge sharing in the team, and followers' creativity in nursing suggest possible bias. The major concern is related to the use of self-reported creativity. Many variables are already reported in the literature to predict creativity, such as personality traits, openness to experience, and age [6, 60]. Thus, in future studies, substantive control factors must be employed to isolate the effect of potential variables that may affect creativity. After controlling for potential interfering variables, potential predictors of creativity should be found.

Collecting data in Jordan involves a single data-gathering approach, thus limiting generalizability to other countries. The nonprobability convenience snowball sampling was used to collect data from universities and hospitals, restricting the generalizability of the results to other contexts. Due to the cross-sectional research design used in the current study which does not imply causation, the results should be evaluated carefully. Humble leaders involve other external or humble informal leaders, such as team mentors and coordinators, who were not studied in this research.

5. Summary and Conclusion

These lowest means of the studied concepts necessitate immediate organizational interventions. Quality initiatives in organizations and the number of tenures were the most effective predictors of leaders' humble leadership, participants' psychological safety, knowledge sharing in the team, and followers' creativity. Leaders' humble leadership predicted knowledge sharing in the team and followers' creativity, but not participants' psychological safety.

Leadership training and development programs are required to build nurses' and leaders' humble leadership as it contributes to followers' creativity. Workplace boundaries and supportive work environments should be established to improve participants' psychological safety pending knowledge sharing in the team, and in turn, followers' creativity occurs. Organizational attention towards creating conditions for participants' psychological safety and knowledge sharing would result in high levels of followers' creativity. Additional studies with a bigger random sample and other research designs are required in other settings and cultures, particularly those involving novel findings.

6. Implications

6.1. In Practice and Education. Leaders' humble leadership helps facilitate knowledge sharing in the team as it relates to followers' creativity of the current study's edgy participants'

psychological safety, indicating that psychological safety should not warrant creative outcomes only [6], but knowledge sharing should always be present. Furthermore, workplace limits should be established so that firms can get high levels of creativity from their followers; nevertheless, psychological safety, humble leadership, and knowledge sharing should be offered concurrently [6, 12].

Also, humble leadership helps facilitate followers' creativity. Humble leadership must be acquired, developed, and sustained [6], requiring training programs to assist leaders in understanding and developing humble leadership. Humble leaders should be chosen and employed while hiring.

Since it was tense, several organizational and leadership actions effectively developed participants' psychological safety [6]. This study included encouraging followers by respecting and exploiting their unique abilities and talents and avoiding the blame culture when someone makes a mistake. These acts would help to foster supportive relationships and establish trust between humble leaders and team members [13].

Humble leadership, psychological safety, knowledge sharing, and followers' creativity are non-nursing concepts that should be integrated into the nursing curricula at the undergraduate and graduate levels, as today's students are tomorrow's nurses.

6.2. In Research. According to Lusso et al. [61], the researcher could only study the complete population. As a result, the conclusions derived from the created sample were intended to extend to Jordan's full population of nursing academics, nurses, nursing leaders, and organizational characteristics. Thus, the researchers should choose a sample representative of the population mentioned above.

The current results indicate that participants' psychological safety was precarious; thus, further investigation of the causes is required, including integrating qualitative research designs or mediating mechanisms to determine how concepts studied relate to one another and how they produce followers' creativity.

Like Wang et al. [6], many professionals in Jordan work in a strongly collectivist and high-power distance culture. Since humble leadership is a culturally driven notion, more research in various cultures and countries is required. Thus, more research is needed to assess leaders' humble leadership and followers' creativity.

The current study reported many novel findings, including the predictors of the concepts such as that marital status predicted leaders' humble leadership and knowledge sharing. The quality initiatives predicted participants' psychological safety and followers' creativity. These unusual findings should be examined further with bigger, randomized samples in various situations.

Data Availability

Data are available on request due to privacy/ethical restrictions.

Conflicts of Interest

The authors declare that they have no potential conflicts of interest concerning this article's research, authorship, and publication.

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Research Article

Leveraging Supervisor Knowledge Sharing Behavior and Organizational Absorptive Capacity on Nurses' Creativity

Ahmed Abdelwahab Ibrahim El-Sayed ¹, Nariman Ahmed Mohamed Elbassal ¹,
Samira Ahmed Alsenany ² and Sally Mohammed Farghaly Abdelaliem ³

¹Nursing Administration Department, Faculty of Nursing Alexandria University, Alexandria, Egypt

²Department of Community Health Nursing, College of Nursing, Princess Nourah bint Abdulrahman University, P.O. Box 84428, Riyadh 11671, Saudi Arabia

³Department of Nursing Management and Education, College of Nursing, Princess Nourah bint Abdulrahman University, P.O. Box 84428, Riyadh 11671, Saudi Arabia

Correspondence should be addressed to Sally Mohammed Farghaly Abdelaliem; sally.farghaly@alexu.edu.eg

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Background. Nurses' creativity is an imperative necessity for healthcare organizations to grow. The creative abilities of nurses are affected by many factors; some of these factors are stimulants and some of these are inhibitors. Supervisors' knowledge sharing behavior and the capacity to absorb new knowledge and technologies are important factors in the recent era that delineate the creativity of nurses. **Aim of the Study.** Assess the effect of supervisor knowledge sharing behavior and organizational absorptive capacity on nurses' creativity. **Method.** Cross-sectional multicenter descriptive correlational exploratory research design was used to conduct the study. Data were collected conveniently from 700 nurses recruited from five large hospitals at Alexandria, Egypt, using three self-administered printed questionnaires. Findings were investigated via descriptive and inferential statistics as well as structured equation modeling. **Results.** Nurses' creativity was positively associated with supervisor knowledge sharing behavior and organizational absorptive behavior ($r=0.619$, p value <0.001 , and $r=0.545$, p value <0.001 , respectively). Supervisor knowledge sharing behavior accounted for 87% of variance in nurses' creativity, while organizational absorptive capacity accounted for 55% of variance in nurses' creativity. **Conclusion.** Supervisors' knowledge sharing behavior and absorptive capacity of organization are powerful significant stimulants for nurses' creativity. **Implications to Nursing Management.** Hospital directors, managers, and nursing leaders should cultivate knowledge sharing behavior in healthcare settings by establishing a reward and incentive system for healthcare workers who share their knowledge with their colleagues for mutual benefit and organizational development.

1. Introduction

The economic decline and inflation around the world have been affecting healthcare in all its aspects, which prompted organizations to attract cadres from creative health care providers [1]. Moreover, the sustainability and competitiveness of healthcare organizations in the contemporary highly turbulent economic environment articulated around three critical attributes, namely, organizational culture that motivate leaders to share their experiences and knowledge in

a successful manner, absorptive capacity of organization, and the ability of organization to recruit creative and innovative nurses who are able to use different sources of knowledge to provide efficient integrated nursing care [2].

Today, financial and technological resources are not the only advantages of healthcare organizations. It is important to have creative nurses who can compensate for the lack of other resources [3]. Understanding the strategic role of human resources especially nurses in making excellence is one of the value added features of successful healthcare

organization. Only successful organizations are able to delineate stimulants and barriers of creative performance of their nurses. Numerous antecedents and factors can stimulate nurses' creativity; however, knowledge sharing behavior exhibited by their leaders as well as the absorptive capacity of organizations to invest in novel knowledge sources and technology modalities are two factors responsible for the majority of creative ideation among nurses [4].

Knowledge sharing is a corner stone process as no one person cannot generate all the knowledge needed to carry out his/her everyday tasks [5]. Everyone must therefore acquire outside knowledge and experience [6]. According to Che et al. [5], individuals within organizations, including supervisors, can impart their knowledge and experience on others. Supervisors can also help their subordinates improve their work by imparting knowledge or useful information [7]. The value of knowledge and experience in creative performance has been demonstrated in the prior studies [8, 9]. Supervisor knowledge sharing behavior is regarded as prosocial behavior that is beneficial to nurses. When supervisors share their valuable knowledge, experts, and skills with nurses, they are likely to feel appreciated and learn this behavior [10]. Firms should choose individuals who frequently share their knowledge with others when staffing supervisory positions. Moreover, healthcare firms should encourage nursing supervisors as well as give supervisors a substantial amount of time and opportunities to share their knowledge with nurses [4].

Explicit knowledge and tacit knowledge are the two categories of knowledge [11]. Objective knowledge that can be expressed, codified, and conveyed using formal language is known as explicit knowledge. Tacit knowledge is described as subjective knowledge that is challenging to articulate, codify, and transfer [11]. Although it is challenging to convey tacit knowledge, supervisors can do so through interacting with, socializing with, and training their subordinates [12]. In addition, networking with others and face-to-face conversation can lead to information sharing [13]. Sharing information and experience with subordinates can be beneficial for supervisors. The ability to think creatively depends on knowledge [8, 14]. Supervisors can work with others to create and implement new ideas or procedures as well as exchange task-relevant ideas, knowledge, experience, and suggestions with subordinates [12]. Che et al. [5] asserted that employees' creative performance would be enhanced by learning from sources within organizations such as supervisors and leaders.

Absorptive capacity is the dynamic capacity that allows organization to create value, gain, and sustain a competitive advantage through the management of the external knowledge [15]. It is the ability of the organization to identify technological opportunities in its external environment and apply them to obtain a better performance [16]. Healthcare organizations can upgrade their absorptive capacity by mastering knowledge management skills, especially knowledge acquisition, learning, and assimilation systems. If these organizations need to shape their creativity strategies, they not only need to absorb new information from the environment but also use it internally [15].

Knowledge sharing behavior of supervisors and absorptive capacity are two concepts that are closely related. The relationship between them is interdependent and complementary. Knowledge sharing of supervisors can be seen as an antecedent of absorptive capacity because it provides the necessary knowledge for absorptive capacity to occur. On the other hand, absorptive capacity can be seen as an antecedent of knowledge sharing because it provides the necessary context for knowledge sharing to occur [17].

Koseoglu et al. [18] described creativity as the development of novel, useful products and processes. Creativity is essential for organizational innovation, performance, growth, and long-term survival. Every nurse has a creative mode, but it is frequently inhibited by internal and external variables including time, overly rigid control systems, and an excessive dependence on standard operating procedures [19]. Creativity is imperative for nursing practice as when there are no clear answers or courses of action, nurses can rely on their creativity to come up with new solutions and make decisions. In this context, the work of Zuber and Moody [20] highlighted that creativity in nursing care includes fluidity of mind and the creation and acceptance of new ideas for patient care in such a way that the new methods are simple, useful, efficient, affordable, and safe.

When it comes to creativity, knowledge sharing can benefit creativity through absorptive capacity and knowledge integration. Thuan [21] found that knowledge sharing was positively related to team creativity, fully mediated by both absorptive capacity and knowledge integration. In addition, cognitive team diversity played a moderating role in the relationship between knowledge sharing and organizational absorptive capacity, as well as in the relationship between knowledge sharing and knowledge integration [3].

1.1. Significance of the Study and Research Gap. Stimulating nurses' creativity is of paramount importance for healthcare organizations and nursing practice [1]. Recent studies stressed on the promising role of nurses' creativity toward buffering resources depletion and giving organization high magnetism power that enable it to attract patients and qualified cadres [2, 22]. This also strengthens organization in the pursuit of competitive advantage and sustainability [23]. Moreover, studying factors that stimulate creativity is highlighted in different scholars as recent required research direction due to its powerful role in transforming the conventional nursing practice and making it smart, flexible, green, evidence-based, patient-centered, and holistic practice [1]. Meanwhile, international council of nurses dedicates its efforts to shape nursing policy in the sustainable developmental era highlighting the importance of investment in nursing creativity [2]. Despite all these calls, nurses' creativity does not receive considerable attention in recent studies. The majority of studies that addressed creativity articulated around perspectives of nurses regarding their creativity. In addition, stimulants and barriers of nurses' creativity are not adequately explained with limited studies that shed the light on the role of different factors like

clinical practice environment [3], career development, job embeddedness [24], and polychronicity [25] on nurses' creativity in the Egyptian and international contexts.

The concepts of supervisor knowledge sharing behavior and absorptive capacity have gained high momentum recently in knowledge management literature [15]. Several studies examined their role in shaping innovation and employees' performance at different contexts like tourism [26], information technology agencies [21], public services settings [27], and petroleum companies [8]. Meanwhile, opinions of respected nursing authorities give consensus that supervisor knowledge sharing behavior and organizational absorptive capacity are important factors to build creativity among nurses [28]. However, these factors were not tested empirically in nursing context. To address this gap, our study aims to empirically examine the role of supervisor knowledge behavior and absorptive capacity toward nurses' creativity. Investigating the interplay among these factors could help nurse leaders to develop trusted strategies for cultivating creative work environment for nurses which ultimately improves quality of patient care and eradicate patient safety threats.

1.2. Theoretical Framework and Hypothesis Formulation.

This study combines organizational learning theory and organization knowledge management model developed by Vespo [29] to explain the relationship between knowledge sharing behavior, absorptive capacity, and nurses' creativity. According to organizational learning theory, organizational learning occurs through acquiring new knowledge shared from past experiences and absorbing new knowledge from outside organizations which could reinforce using absorptive capacity strategies [30]. Organizational learning theory believed that organizational learning is the behavioral process of organization employees to promote innovation and creative ideation using knowledge sources gained by sharing and absorbing [15]. In addition, the theory also assumed that fertilizing the land for creativity and innovation to grow require the organization to mix between both adaptive learning based on environmental change response and active learning based on self-motivation. In this respect, Vespo [29] uses the assumptions of organizational learning theory and develops simplified model illustrating organizational knowledge management. Accordingly, knowledge management starts with identifying new knowledge sources through knowledge sharing which in turn lead to elaboration through combining different skills with each other. The Result of this elaboration is in the first place the outcome itself, which may be creation or an innovation or an improvement of an existing service [29]. Our study uses the assumptions of organizational learning theory and the work of Vespo to conceptualize and predict the relationship between the three variables. Figure 1 shows our proposed conceptual framework illustrating the relationship between knowledge sharing behavior of supervisor, organizational absorptive capacity (independent variables), and nurses' creativity (dependent variable).

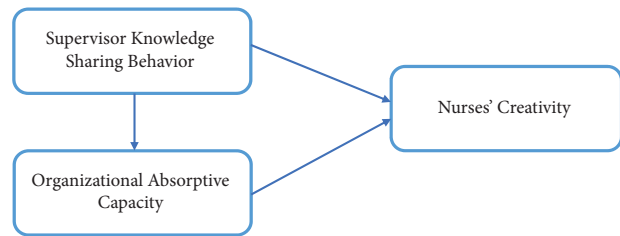


FIGURE 1: Conceptual model illustrating the relationship between study variables.

1.3. Study Hypotheses

- H1. There is a relationship between supervisor knowledge sharing behavior and nurses' creativity
- H2. There is a relationship between organizational absorptive capacity and nurses' creativity
- H3. Supervisor knowledge sharing behavior has positive effect on stimulating nurses' creativity
- H4. The level of organizational absorptive capacity has positive effect on stimulating nurses' creativity

2. Methods

2.1. *Aim.* The study aims to investigate the effect of supervisor knowledge sharing behavior and organizational absorptive capacity on nurses' creativity.

2.2. Research Question

- (i) To what extent nursing supervisors share their knowledge with nurses?
- (ii) What is the level of organizational absorptive capacity perceived by nurses?
- (iii) What is the level of creativity among nurses?
- (iv) Is there a relationship between supervisor knowledge sharing behavior and nurses' creativity?
- (v) Is there a relationship between the level of absorptive capacity of organization and nurses' creativity?

2.3. *Design.* A cross-sectional multicenter, correlational, and descriptive research study design was used.

2.4. *Study Settings.* This study was carried out at five hospitals in Alexandria, Egypt: the Alexandria Main University Hospital, the Gamal Abd-Nasser Hospital, the Sharq El Medina Hospital, the Al Gomhoreya Public Hospital, and the Mabaret Alasafra Hospital. These hospitals are affiliated to the University, the Health Insurance Organization, the General Secretary of Specialized Medical Centers, Ministry of Health and Population, and Private sectors, respectively. Each of the selected hospitals was selected as it is considered the largest capacitated one in terms of nurses' number and bed capacity. Moreover, these hospitals participate actively in "innovate Egypt" program that was launched by the

Egyptian government to ultimately connect educational services for enhancing healthcare-related knowledge with community requirements in different healthcare directions through empowering the next generation of Egyptian innovators that include different healthcare providers (e.g., nurses, physicians, technicians, and so on).

2.5. Study Participants and Sampling. A straightforward sampling by power analysis technique was used to pick a sample of 700 nurses ($n = 700$) from the total population of 1510 nurses in the chosen settings: 1510 total subjects, 95% confidence level, 5% margin of error, problem prevalence is 50%, and a maximum sample size of 700. It was determined that 20 individuals would be sufficient to conduct a reliable regression analysis because 20 participants were required for each study variable.

2.6. Study Measurements. Demographic data including age, gender, qualification, unit, current position, and years of experience were collected using personal and work-related data questionnaire.

2.7. Supervisor Knowledge Sharing Behavior. To assess supervisor knowledge sharing behavior, we developed a tool based on literature review. It consists of 11 items: five items adapted from Thuan [21] and six items adapted from Nifadkar et al. [31]. The items grouped into two dimensions, namely, supervisor explicit knowledge sharing behavior (8 items, Cronbach alpha, $\alpha = 0.766$) and supervisor tacit knowledge sharing behavior (3 items, $\alpha = 0.809$). Participants rated each item on a five-point scale (1 = strongly disagree to 5 = strongly agree). We calculated the average score for each dimension, and the total scale score (Cronbach alpha, $\alpha = 0.861$) was the average of the two dimensions; higher scores indicate that nursing supervisors have a high level of knowledge sharing behavior. Supervisors' levels of knowledge sharing were classified as follows: less than 50% for low level, 50% to less than 75% for moderate level, and 75% for high level.

2.8. Organizational Absorptive Capacity. We used the organizational absorptive capacity questionnaire for assessing absorptive capacity from the perspective of nurses [32]. This scale consists of ten items. We computed the average score for the total scale score using Cronbach alpha, $\alpha = 0.900$. Responses were measured on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The overall score level ranges from 10 to 50. Higher scores indicate high level of absorptive capacity. The levels of absorptive capacity of organization were arranged as follows: less than 50% for low level, from 50% to less than 75% for moderate level, and $\geq 75\%$ for high level of absorptive capacity.

2.9. Nurses' Creativity. To assess nurses' creativity, we used the creativity self-assessment questionnaire [33]. It consists of 28 items. The items grouped into 4 dimensions, namely,

generating ideas (7 items, $\alpha = 0.779$), digging deeper into ideas (7 items, $\alpha = 0.736$), exploring ideas (7 items, $\alpha = 0.792$), and listening to the inner voice (7 items, $\alpha = 0.710$). This tool demonstrated acceptable reliability where Cronbach alpha, $\alpha = 0.73, 0.771$ in the studies of Adyasha and Duraipandian [34] and Naqvi et al. [35], respectively. We computed the average score for the total scale score (Cronbach alpha, $\alpha = 0.939$). Responses were measured on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The overall score level ranges from 28 to 140. Higher scores indicate a high level of creativity. The levels of nurses' creativity were defined as follows: less than 50% for low creativity, from 50% to less than 75% for moderate creativity, and $\geq 75\%$ for high levels of creativity.

2.10. Study Tools Adaptation, Validity, and Reliability

2.10.1. Tools Translation. Tools were translated from English versions into Arabic versions (see Supplementary 1) using the back-to-back translation technique [36] to adapt to Egyptian culture, ensure accuracy, and eliminate any potential threats to the study's validity.

Following the translation of the tools, we employed various methods to evaluate their validity and reliability, such as following Steps 1–6 of DeVellis' [37] model for scale development (see Figure 2) in relation to the coding instrument created. Clarification of the construct and development of an item pool were informed by a review of the literature review [21, 31]. In addition, content validity, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), corrected item-total correlations, and Cronbach's alpha were applied. We used IBM SPSS software package version 22.0 and AMOS version 23.0 for the analyses (see Supplementary 2).

2.10.2. Content Validity. A group of seven academics from the discipline includes three professors of information and data management and four professors of nursing administration. The panel identified word choice problems, typing errors, and punctuation errors. Several words were changed in response to their suggestions. In order to verify the accuracy and functionality of the instruments and determine the amount of time needed to complete study questionnaires, a pilot study with 70 nurses was also carried out and no modifications were made.

2.10.3. Construct Validity. Both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to assess the construct validity of the translated tools.

Kaiser normalization was used in conjunction with Promax rotation to conduct an exploratory factor analysis (EFA). The objective of the EFA was to pinpoint the fundamental elements or dimensions that account for the variation in each questionnaire item's response.

The EFA of the supervisor knowledge sharing behavior questionnaire revealed a clear and consistent factor structure that reflected the two dimensions of the scale

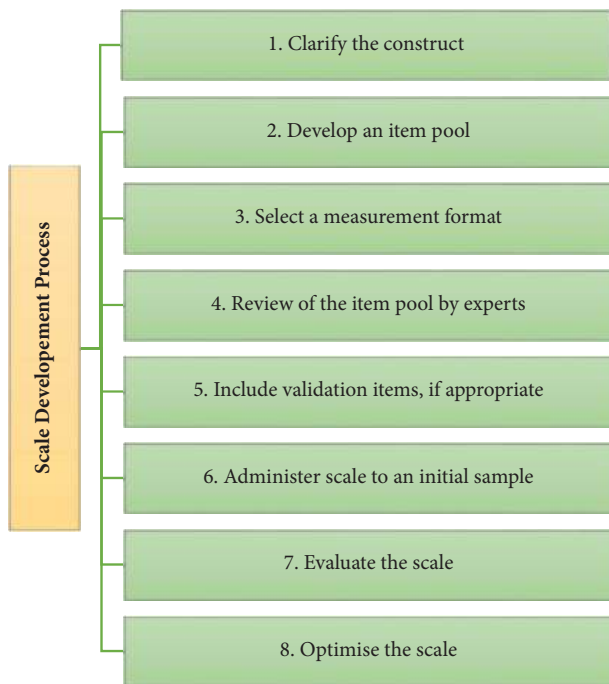


FIGURE 2: Steps in scale development [37].

with high boldface loadings for all items, ranging from 0.543 to 0.909 which means that the items strongly contribute to their factor. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.703, which indicates the appropriateness of the data for factor analysis and that there is a high degree of common variance among the items.

The EFA of the absorptive capacity scale using Kaiser normalization revealed that there are two dominant factors that account for most of the variance in the responses. These factors have high loadings for all items, ranging from 0.617 to 0.747. This implies that it represents a general dimension of polychronic-monochronic tendency and that all items measure the same construct. The KMO value of 0.842 indicates that the data are very suitable for factor analysis, and that there is a high degree of common variance among the items.

The EFA of the nurses' creativity scale revealed a clear and consistent factor structure that reflected the four sections of the tool, with high loadings for all items on the corresponding factor, ranging from 0.522 to 0.756. This means that the items are more clearly nurses' creativity embeddedness. The KMO value of 0.853 indicates that the data are very suitable for factor analysis and that there is a high degree of common variance among the items.

2.10.4. Confirmatory Factor Analysis. CFA was done using structural equation modeling (SEM) for the mean and standard deviation of the three scales used in the study (supervisor knowledge sharing behavior, absorptive capacity, and nurses' creativity). The CFA aimed to test the fit of the factor structure derived from the EFA to the data. The CFA confirmed that the model fits the data very well

(comparative fit index (CFI) = 1.000, incremental fit index (IFI) = 1.000, root mean square error of approximation (RMSEA) = 0.117, Model $X^2 = 5.120$, and $p = 0.001^*$).

2.11. Reliability. The reliability of the tools was assessed using the corrected item-total correlations and internal consistency.

2.11.1. The Corrected Item-Total Correlations. The corrected item-total correlations of the supervisor knowledge sharing behavior questionnaire showed that all items were positively and significantly related to their respective sections and to the overall score of the survey, ranging from 0.576 to 0.905. The corrected item-total correlations of the absorptive capacity scale showed that all items were positively and significantly related to the scale, ranging from 0.628 to 0.763. The corrected item-total correlations of the nurses' creativity scale showed that all items were positively and significantly related to their respective sections and to the overall score of the tool, ranging from 0.536 to 0.827. This means that all items are positively related to their respective subscales and that they measure the same construct as the other items in the subscale.

2.11.2. Internal Consistency. Cronbach's alpha was used to measure the internal consistency of the tools. It is a measure of how well a set of items measures a single construct or dimension. It ranges from 0 to 1, with higher values indicating higher reliability and internal consistency. Cronbach's alpha values for the subscales of the supervisor knowledge sharing behavior ranged from 0.766 to 0.809 and 0.861 for the overall survey. Cronbach's alpha of absorptive capacity was 0.900. Cronbach's alpha values for all subscales of nurses' creativity scale ranged from 0.710 to 0.792, and the overall scale was 0.939. These results indicate acceptable reliability and internal consistency of the three study tools.

2.12. Data Collection. The administration of the hospitals officially approved the collection of data. By delivering the anonymous questionnaire (hand delivered), data were gathered over a three-month period, from the first of May 2022 to the end of July 2022. The questionnaire took around 25 minutes to complete and asked questions about participant demographics, supervisor knowledge sharing behavior, absorptive behavior, and creativity.

2.13. Data Analysis. Frequencies and percentages were utilized to illustrate the socio-demographic data; mean and standard deviation (SD) were employed to display continuous variables. The association between supervisor information sharing behavior, organizational absorptive capacity, and nursing creativity was examined using the Pearson correlation coefficient analysis (r). Inferential statistics (Pearson correlation coefficient and regression analysis (R^2)) were used to examine the study's findings. A 0.05 alpha error was used for all statistical calculations. The

mediating impact of career plateauing was investigated using a structural equation modeling approach. The moderator, organizational absorptive capacity, the independent variable, and the dependent variable, nurses' creativity, were examined by the researchers. All statistical analyses were performed using IBM SPSS Statistics and IBM SPSS AMOS versions 23 (Armonk, NY). The 0.05 level of statistical significance was used to determine the two-tailed nature of all given *p* values.

3. Results

Table 1 reveals that 47% of participants were within the age group 25–40 years with a mean score of 34.19 ± 10.16 . Furthermore, near to two-thirds of the participants were female (61.6%) with a Bachelor of Science Degree in Nursing (48.4%) followed by Diploma Degree in Nursing (30.6%) with 49.6% of participant with years of experience less than ten years, followed by 26.9% of them with more than 20 years of experience. In relation to the current working unit, near to one-third of the participants were working in ICU, followed by 20.7 of the participants were working in ER in the following healthcare settings as the majority of them (45.7%) were working at Alexandria Main University Hospital, followed by Gamal Abdel Nasser Hospital (18.3), and both hospitals were public sector, while 15.35 of participants were working at Mabaret Alsafra Hospital, which is related to the private health sector.

Table 2 shows that most of the study participants had a moderate perception level regarding their supervisor knowledge sharing behavior, their organizational behavior regarding absorptive capacity, and creativity (67.4%, 74.7%, and 80.9%), respectively. The mean score (\pm standard deviation) of the supervisor knowledge sharing behavior (possible score range: 1–5) was 3.66 ± 0.43 , and supervisor tacit knowledge sharing behavior had the highest mean domain score (3.91 ± 0.71). The mean score of absorptive capacity (possible score range: 1–5) was 3.62 ± 0.41 . As well as, the mean score of creativity (possible score range: 1–5) was 3.64 ± 0.35 , and generating ideas and digging deeper into idea domains had the highest mean scores (3.69 ± 0.48 and 3.69 ± 0.47 , respectively).

Table 3 shows that nurses' creativity was positively associated with supervisor knowledge sharing behavior and absorptive behavior ($r = 0.619$, p value < 0.001 , and $r = 0.545$, p value < 0.001 , respectively).

Figure 3 depicts the structured equation modeling's standardized regression weights (Chi-square = 1145.530; degree of freedom = 15; p value 0.001). Sharing of supervisory knowledge behavior explained 65% of the variance in organizational absorptive behavior and 87% of the variance in nurses' creativity, whereas absorptive capacity explained 55% of the variance in nurses' creativity. The lowest reliability estimates in the examined model were for the domains of digging deeper into ideas and listening to the inner voice: 0.54 (factor loading = 0.77, p value. 001) and 0.43 (factor loading = 0.75, p value 0.001), respectively. Sample size = 700. Chi-square = 1145.530. Degrees of freedom = 15. Probability level < 0.001 .

TABLE 1: Participants' distribution according to their personal and work-related characteristics.

Demographic and professional data	No.	%
<i>Age (years)</i>		
<25	156	22.3
25–40	329	47.0
≥ 40	215	30.7
Mean \pm SD	34.19 \pm 10.16	
<i>Gender</i>		
Male	269	38.4
Female	431	61.6
<i>Years of experience</i>		
Mean \pm SD	11.76 \pm 10.21	
<10	347	49.6
10–20	165	23.6
≥ 20	188	26.9
<i>Qualification</i>		
Diploma	214	30.6
Bachelor degree	339	48.4
Specialized diploma	70	10.0
Master	62	8.9
PHD	15	2.1
<i>Current working unit</i>		
ER	145	20.7
ICU	255	36.4
NICU	136	19.4
OR	104	14.9
Inpatient units	60	8.6
<i>Hospital name</i>		
Alexandria Main University Hospital	320	45.7
Gamal Abdel Nasser Hospital	128	18.3
El Gomhoreya Public Hospital	75	10.7
Shark El-Madina Hospital	70	10.0
Mabaret Alsafra Hospital	107	15.3

4. Discussion

Healthcare organizations should use knowledge sources and manage it in the manner that use lessons learned from the past experiences to build a robust resilient future and maintain competitiveness in turbulent environment. This future flourishes when innovation and creativity of healthcare providers especially nurses are emphasized. So, our study investigates the impact of supervisor knowledge sharing behavior and organizational absorptive capacity on nurses' creativity. It is hypothesized that supervisor knowledge sharing behavior and absorptive capacity have a significant role in stimulating nurses' creativity (the dependent variable). Our study revealed that supervisor knowledge sharing behavior and absorptive capacity are powerful determinants for nurses' creativity.

4.1. Supervisor Knowledge Sharing Behavior and Nurses' Creativity. Our study revealed a significant positive relationship between supervisor knowledge sharing behavior and nurses' creativity. This means that H1 of our study is accepted which give impression that sharing sources of knowledge and experiences by leaders could definitely

TABLE 2: Participants' levels of perception regarding the study variables (supervisor knowledge sharing behavior, organizational absorptive behavior, and their creativity).

Study variables	Mean score Mean \pm SD	Low (<50%)		Moderate (50%–<75%)		High (\geq 75%)	
		No.	%	No.	%	No.	%
Supervisor knowledge sharing behavior questionnaire	3.66 \pm 0.43	40	5.7	472	67.4	188	26.9
Supervisor explicit knowledge sharing behavior	3.57 \pm 0.48	65	9.3	471	67.3	164	23.4
Supervisor tacit knowledge sharing behavior	3.91 \pm 0.71	46	6.6	272	38.9	382	54.6
Organizational absorptive capacity	3.62 \pm 0.41	41	5.9	523	74.7	136	19.4
Creativity	3.64 \pm 0.35	18	2.6	566	80.9	116	16.6
Generating ideas	3.69 \pm 0.48	42	6.0	435	62.1	223	31.9
Digging deeper into ideas	3.69 \pm 0.47	39	5.6	451	64.4	210	30.0
Exploring ideas	3.52 \pm 0.43	71	10.1	503	71.9	126	18.0
Listening to the inner voice	3.68 \pm 0.40	20	2.9	492	70.3	188	26.9

stimulating nurses' creativity. This result is evident in our study since the majority of nurses had moderate perceived level regarding their creativity and, at the same time, had a moderate perceived level regarding the knowledge sharing behavior of their supervisors. This finding is also supported by results of regression analysis since supervisor knowledge sharing behavior accounts for 87% of variance in nurses' creativity which reflect that stimulating nurses' creativity requires a leader behavior that welcome sharing of previous experiences and dissemination of successful knowledge sources. Moreover, this reflects the high predicting power of supervisor knowledge sharing on shaping nursing creativity which means that H3 of our study is accepted. On other words, our study proved that both creative thinking and behavior among nurses could be flourished and augmented if their leaders share different sources of knowledge along with experiences in the workplace and make this sharing as pattern of improvement and communication.

This finding could be explained in the light of organizational learning theory since this theory believed that sharing of knowledge at different levels build a learning culture characterized by respecting different experiences and welcome ideas and suggestions [15]. The end result of this culture is innovation and creative ideation which is the case in our study. Also, one possible explanation of this relationship is that the knowledge sharing behavior of leaders could empower nurses in their workplace making them engaged which definitely stimulate their talents and ultimately foster the innovative and creative thinking which is the core philosophy of organization knowledge management model developed by Vespo [29]. Our finding concerning the correlation among supervisor knowledge sharing behavior and creativity is in line with the studies of Dong et al. [38], Hosseini et al. [39], Widyani et al. [40], and Revilla and Rodriguez-Prado [41]. These studies have agreed on the role of knowledge sharing among healthcare team in shaping the cognitive abilities of its members. Also, these studies found that the creative ability of staff is affected by the degree to which knowledge management process especially knowledge sharing is exercised in healthcare facility. In this context, the studies of Uyan and Şanal [12] and Kirpik and Çetin [42] found that knowledge sharing behavior in healthcare

organizations could boost ambidexterity which is a metaphor for creativity and innovation which could further support our finding.

Our study proved that knowledge sharing is the most affecting factor in nurses' creativity. Moreover, knowledge sharing is a prerequisite for better performance and competitiveness gained from the creative and innovative abilities of nurses. This empirical evidence supports the ideas of Rafique and Mahmood [43] and Shaari et al. [44], who stated that knowledge sharing fosters a cohesive environment in which employees share their field-related experience, novel ideas, and job-related knowledge with one another. They learned a lot from one another and became more creative as a result. Knowledge sharing assists healthcare professionals in developing various creative approaches to patient care, thereby improving their innovative capabilities and, as a result, their work performance. Furthermore, the study of El-Sayed et al. [45] clarified that knowledge sharing behavior adopted by collaborative leaders significantly foster nurses' innovative work behavior and fuel their creativity. Conversely, the studies of Thuan [21] and Ye et al. [14] found weak role of knowledge sharing toward employees' creativity. This contradictory from our study may be due to these studies conducted on employees working in different contexts that may do repetitive tasks with high routine where knowledge growth and development are not core necessity.

It is great to find that knowledge sharing behavior is adopted by supervisors and leaders in a wide scale in our study since more than two-thirds of nurses reported that their supervisors share different sources of knowledge with them. This finding is in line with the results of Widyani et al. [40], Magnier-Watanabe and Benton [46], and Maravilhas and Martins [47] who found knowledge sharing behavior is a hallmark that characterizes the attitudes of self-managed teams. Awad et al. [48] stressed that the majority of nurses were satisfied with the valuable support received from first line nurse managers. Also, the main source of support reported by nurses is knowledge and expertise sharing. In contrary, Sodeify et al. [49] and Senek et al. [50] clarified that nurses perceived low level of the supervisors' support and low tendency to share their expertise. This may be due to poor workplace conditions that also perceived by nurses in

TABLE 3: Correlation between supervisor knowledge sharing behavior, organizational absorptive behavior, and creativity.

	Supervisor knowledge sharing behavior questionnaire		Organizational absorptive capacity		Creativity			Overall
	Supervisor explicit knowledge sharing behavior	Supervisor tacit knowledge sharing behavior	Overall	Supervisor knowledge sharing behavior	Generating ideas	Digging deeper into ideas	Exploring ideas	
Supervisor knowledge sharing behavior questionnaire								
Supervisor explicit knowledge sharing behavior	r	0.180*	0.895*	0.010	0.071	0.079*	0.563*	0.710*
	p	<0.001*	< 0.001*	0.788	0.060	0.038*	<0.001*	<0.001*
Supervisor tacit knowledge sharing behavior	r	0.373*	0.599*	0.373*	0.528*	0.695*	0.351*	0.347*
	p	< 0.001*	< 0.001*	< 0.001*	<0.001*	<0.001*	<0.001*	<0.001*
Overall	r	0.177*	< 0.001*	0.177*	0.297*	0.379*	0.618*	0.735*
	p	< 0.001*	< 0.001*	< 0.001*	<0.001*	<0.001*	<0.001*	<0.001*
Organizational absorptive capacity	r	0.765*	0.765*	0.765*	0.765*	0.578*	0.252*	0.074*
	p	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	0.049*
Creativity								
Generating ideas	r	0.764*	0.764*	0.764*	0.764*	0.764*	0.421*	0.206*
	p	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
Digging deeper into ideas	r	0.549*	0.549*	0.549*	0.549*	0.549*	0.549*	0.415*
	p	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
Exploring ideas	r	0.747*	0.747*	0.747*	0.747*	0.747*	0.747*	0.747*
	p	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
Listening to the inner voice	r	0.714*	0.714*	0.714*	0.714*	0.714*	0.714*	0.714*
	p	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
Overall	r	0.714*	0.714*	0.714*	0.714*	0.714*	0.714*	0.714*
	p	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

r: Pearson coefficient. * Statistically significant at $p \leq 0.05$. The bold values represent the focus of data presentation to the highly significant results.

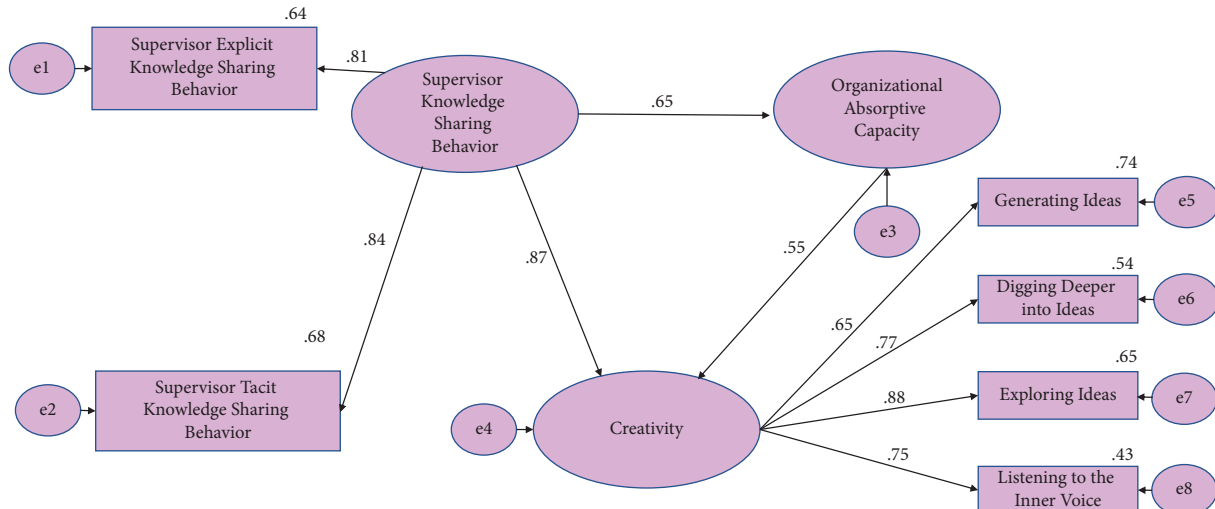


FIGURE 3: Path diagram with standardized parameter estimates.

these studies which affect their perceptions toward all positive workplace variables including support and knowledge sharing.

4.2. Organizational Absorptive Capacity and Nurses' Creativity. Our findings revealed significant positive relationship between absorptive capacity of organization and nurses' creativity. This means that H2 of our study is accepted which give impression that the high capacity of healthcare organization to absorb current and emerging internal and external knowledge sources is associated with high levels of nurses' creativity. This is supported by nurses' perceived levels of absorptive capacity and creativity since the majority of nurses have moderate perceived levels regarding the capacity of their organizations to absorb knowledge sources, and at the same time, they have moderate perceived levels regarding their creativity. Meanwhile, our study found that organizational absorptive capacity is a powerful antecedent for nurses' creativity since regression analysis revealed that absorptive capacity accounted for 55% of variance in nurses' creativity which means that our H4 is supported.

One possible explanation of this result is that absorptive capacity allows organizations to actively seek external sources of knowledge, such as collaboration with other firms, partnerships with research institutions, or participation in conferences. By accessing diverse knowledge, organizations are exposed to new perspectives, different ways of thinking, and alternative approaches. This exposure to diverse knowledge sparks new ideas, encourages innovation, and fuels creativity within the organization. In addition, absorptive capacity enables organizations to integrate external knowledge with their existing knowledge base. By bringing together different ideas, concepts, and perspectives, organizations can create novel combinations that often lead to innovative solutions and stimulate creativity. Our finding is the case in similar studies like Hameed et al. [51], Liu et al. [9], Asurakkody and Kim [52], and Motaghi et al. [53]. These studies found that absorptive capacity is a critical

determinant for nurses' creative and innovative behavior. Conversely, the studies of Maleski et al. [54] and Fulgence et al. [27] yielded that employees' performance including the creative abilities is not significantly affected by knowledge absorptive capacity. This contradiction with our finding may be the presence of confounding factors like employees' traits, work environment, and motivation in the linkage between creativity and absorptive capacity. These confounding factors may deter absorptive capacity from exerting its role toward creativity.

4.3. Supervisor Knowledge Sharing Behavior and Organizational Absorptive Capacity. Our study revealed significant positive correlation between supervisor knowledge sharing behavior and absorptive capacity. This correlation is supported in our study since the majority of nurses have moderate perceived level regarding the knowledge sharing behavior of their supervisors and at the same time they have moderate perceived level regarding the capacity of their organizations to absorb, assimilate, and utilize knowledge sources for fueling innovation and creativity. Moreover, our results depict that supervisor knowledge sharing behavior accounted for 65% of variance in the absorptive capacity of organizations. This gives impression that supervisor knowledge sharing behavior is critical pivotal factor in upgrading the absorptive capacity of organizations which is necessary to sustain innovation and creativity. Meanwhile, this implied that healthcare organization could build its innovation and creativity capacity if it cultivates a culture for knowledge sharing among top leaders and employees.

Our results in this point reflect the national efforts implemented by the Egyptian state to strengthen the Egyptian human being and this could explain the results yielded in our study. Nurses in the study settings are able to access to the different sources of knowledge installed in the Egyptian knowledge bank (EKB). Meanwhile, the General Authority for Health Accreditation and Regulation (GAHAR) makes it obligatory for health facilities to share and publish health-related data in order to be eligible to

universal health insurance schemes. Moreover, Internet access by healthcare providers becomes applicable and easy in the study settings after the inception of information literacy initiative taken by the Egyptian knowledge bank in collaboration with Ministry of Telecommunication. This finding is in line with the studies of Innis and Berta [55], Zhang et al. [17], and Motaghi et al. [53]. These studies reported a considerable credit for the absorptive capacity of the organizations that adopt knowledge sharing as way for improvement and sustainability.

4.4. Interplay between Supervisor Knowledge Sharing Behavior, Organizational Absorptive Capacity, and Nurses' Creativity. Our study revealed that absorptive capacity of organization could mediate the linkage between supervisor knowledge sharing behavior and nurses' creativity. This means nurses' creativity could ultimately be fostered if the organization builds high absorptive capacity in an environment where knowledge sharing is an absolute theme. This conclusion is consistent with Hameed et al's [51], who reported that absorptive capacity in the employability of knowledgeable workers works as a mediator between knowledge acquisition and innovation. In this context, Sancho-Zamora et al. [56], Cuevas-Vargas et al. [57], and Motaghi et al. [53] found the absorptive capacity of an organization is the key toward innovation and creativity in the presence of magnet features like knowledge sharing. All in all our study proved that in order to add value in any healthcare organization, creativity of nurses must be highlighted. Stimulating creativity requires open access for different sources of knowledge as well as enhancing the capacity to absorb different expertise and new knowledge elicited in a continuous basis.

5. Conclusion

Our study investigated the impact of supervisor knowledge sharing behavior and absorptive capacity toward nurses' creativity. It is concluded that supervisor knowledge sharing behavior and absorptive capacity play an important role in stimulating nurses' creativity, as supervisor knowledge sharing behavior accounted for 87% of variance in nurses' creativity and absorptive capacity accounted for 55%. Moreover, supervisor knowledge sharing behavior and absorptive capacity are powerful antecedents for nurses' creativity.

5.1. Implications of the Study. Based on the empirical evidence, our study provides some practical implications for nurses' managers, hospital administrations, and nurse educators. First, our study implied that modern management approaches must develop a systemic policy for knowledge management that provides a platform that maximizes individuals' capacity to learn and grow. Second, hospital directors, managers, and nursing leaders should play an important role in encouraging knowledge sharing by establishing a reward and incentive system for healthcare workers who share their knowledge with their

colleagues for mutual benefit and organizational development. Third, hospital executives must communicate the benefits of knowledge sharing to employees. They must encourage and provide the necessary support, assistance, and even resources for nurses to share knowledge because knowledge and ideas sharing improves creative behavior and capabilities in organizations. Fourth, nursing school administrators should focus on developing nursing students' critical thinking skills through challenging curricula that stimulate students' high cognitive domains of thinking, resulting in future creative nurses. Fifth, stimulants and barriers of creativity in nursing schools must be taken as priority in the recent context in order to graduate nurses able to cope with technology revolution repercussions. Sixth, nursing leaders must develop creativity pathway in which talents and successful proven experiences are considered and motivated. Seventh, recruitment policies must include measures to attract leaders with a high expertise and high tendency for knowledge sharing. Finally, the selection and placement process of leaders and nurses must include tests for examining the tendency toward knowledge sharing.

5.2. Research Strengths and Limitations. Our study offers new insights on stimulants of nurses' creativity. It is one of the first studies that shed the light on the interplay between knowledge sharing behavior, organizational absorptive capacity, and creativity in the nursing context. Our study adds to nursing literature through providing empirical evidence about the role of knowledge sharing behavior and organizational absorptive capacity on stimulating creativity among nurses. In addition, it gives strategies and measures for nurse managers to keep their organizations competitive and sustainable in the era of globalization and intense lobar competition through acting on the creativity of nurses. Our study is one of the initiatives geared toward achieving sustainable developmental goals worldwide. Our study has high reliability as it is a multicenter study that uses robust statistical methods to ensure the validity and reliability of the instruments used. However, there are some limitations that must be recognized. Because the current findings are based on self-reported data, they are susceptible to response bias and subjectivity.

Data Availability

The data and materials of the current study are not publicly available due to confidentiality reason but are available from the corresponding author on reasonable request.

Ethical Approval

The current study was approved by the Faculty of Nursing's Research Ethics Committee at Alexandria University (No: 83-9-2022). The administrative authority of the study setting gave written permission to conduct the study. All methods were carried out in accordance with relevant guidelines and regulations.

Consent

The first page of the questionnaire explained the purpose of the study, assured respondents that their responses would be voluntary and confidential, and stated that researchers would consider the completion and submission of the questionnaires as consent to participate. Informed consent was obtained from all the participants included in the study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

All authors participated in the research idea, conceptualization, data collection, analysis, and preparation of the manuscript for publication.

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Supplementary Materials

Supplementary File 1. English Version of the Questionnaire: this file includes the final validated study tools used in data collection and analysis. *Supplementary File 2.* Tool Factor Analysis and Validity: this file includes the detailed testing of the study tools validity and reliability including the item factor analysis. (*Supplementary Materials*)

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Research Article

Licensed Practical Nurses' (LPNs') Evaluations of the Attractiveness of Work and Wellbeing at Work: A Cross-Sectional Nationwide Study

Mia Roos ¹, Juho Kopra ², Terhi Tevameri ³, Sari Viinikainen ⁴,
and Lauri Kuosmanen ¹

¹University of Eastern Finland (UEF), Department of Nursing Science, Kuopio, Finland

²University of Eastern Finland (UEF), School of Computing, Kuopio, Finland

³Economic Development and Employment, Espoo, Finland

⁴Tehy-The Union of Health and Social Care Professionals in Finland, Helsinki, Finland

Correspondence should be addressed to Mia Roos; miaroos@student.uef.fi

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Background. Severe challenges in recruiting and retaining healthcare workers exist on a global level and are especially noticeable in elderly care services. Previous studies have not assessed how the attractiveness of a job is related to wellbeing at work among licensed practical nurses (LPNs) even though these professionals are vital in providing care to the elderly. **Objective.** The purpose of this study is to define factors that affect LPNs' attractiveness of work and wellbeing at work. **Design.** A cross-sectional survey study. **Participants.** A large-scale nationwide sample of 10 848 licensed practical nurses (LPNs) working in Finland. **Methods.** An online survey for LPNs working in Finland was conducted. Criteria for a good workplace (CFGW), measuring the attractiveness of work and wellbeing at work, were utilized. Descriptive and comparative analyses were performed. Cronbach's alpha values were tested to assess internal consistency ($\alpha = 0.739\text{--}0.915$). An ANOVA or *t*-test result which indicated a statistically significant between-group difference (which was in line with difference ≥ 0.1) was considered as both statistically significant and significant in practice. **Results.** The core group, LPNs' wellbeing at work ($m = 4.36$), is extremely important factor of attractiveness of work. Regarding the subgroups high quality of care ($m = 4.61$), reconciling of work and private life ($m = 4.59$) and well-functioning practices ($m = 4.55$) were most important. Well-functioning practices associated with several background variables, e.g., with working for full-time ($p \leq 0.001$, mean = 3.10) and age ($p < 0.001$). LPNs over 56 years old, especially, regard well-functioning practices important ($p = 3.17$). LPNs' who were 56 years old or older ($m = 3.12$) and those who had work experience 1 year or less ($m = 3.19$) stated rewarding work most important. **Conclusions.** The core group, wellbeing, is an exceptionally important for the LPNs attractiveness of work. The LPNs' wellbeing at work is supported by the quality of care and reconciliation of work and private life.

1. Background

The social and healthcare industry is facing severe challenges in recruiting and retaining a skilled workforce, and this is a global phenomenon. As such, there is a high demand for healthcare professionals, qualified registered nurses (RNs) and licensed practical nurses (LPNs), with this demand only

expected to increase [1, 2]. These workforce shortages particularly threaten elderly care services since LPNs and RNs are the largest professional groups in healthcare, representing over half of the global workforce [3]. The WHO estimates that there will be a global lack of 10 million qualified healthcare workers by 2030 [4]. As such, the healthcare industry needs 43 million additional healthcare

workers to achieve the targeted level of healthcare [5]. It is worrying that access to quality healthcare services, which is considered a basic human right, cannot be ensured for everyone, and immediate action is needed to ameliorate this lack of access to equal healthcare [1, 3].

The global demand for qualified nurses is growing rapidly due to several reasons, including population ageing. However, shortages appear when the demand for healthcare professionals exceeds the number of available employees [3]. Every country in the world is burdened by the growing size of the elderly population. For instance, the WHO estimates that “1 in 6 people in the world will be aged 60 years or over” by 2030. According to WHO’s ageing data portal, the amount of people 60 years and older will double to 2.1 billion by 2050 [6]. The greatest changes are expected for low- to middle-income countries around the world, e.g., countries in Middle Asia, South America, and West Africa [6, 7]. Healthcare systems are also burdened by challenges in replacing retiring employees and securing care for the elderly; this is clearly evident in modern welfare states such as Finland [8]. Furthermore, the COVID-19 pandemic highlighted the importance of healthcare personnel and their role in safeguarding the health of the population [9].

The impending healthcare crisis can be linked to the fact that many Organisation for Economic Co-operation and Development (OECD) member countries have not modelled the demand and supply for healthcare services up until 2025 [10]. It is also noteworthy that the definition of workforce shortage differs between countries, policies, and healthcare systems [1]. Typically, the financial and demand pressures associated with workforce shortages are characterized using criteria such as “vacancy fulfillment” or “volume of current vacant post” [11]. In addition, calculating the difference between the number of required healthcare professionals (demand) and the number of available qualified professionals (supply) is used as a policy contingent measure [1]. The occupation shortage lists published by governments also influence decision-making by, for example, the WHO and World Bank [12]. The already noted shortages in the workforce mean that countries must cooperate to create both a national system that meets the demand, as well as a resilient international network that ensures equal access to healthcare [1, 7].

The LPN role needs better recognition if healthcare systems are to overcome the nursing shortage [2]. The WHO has also noted that nursing professions, in general, require more appreciation to make the job desirable to future healthcare professionals [3]. Aiken et al. [13] concluded already in the year 2013 that without improvements in work environment nurse shortages are expected. Nurses’ dissatisfaction at work is associated with the quality of care as well [14]. Addressing nursing shortages requires empirical data about how LPNs perceive their role in health care and the attractiveness of LPNs’ work based on the long-term work satisfaction and motivation [15]. Moreover, promoting the wellbeing of the healthcare workforce is essential in retaining professionals in the industry. Nurses, working continuously with patients, have the best information for health care leaders in decision making to overcome critical workforce

challenges motivation [13]. Current work environment and role confusion does not support wellbeing of nursing workforce to the fullest potential [15, 16].

Evidence-based research, alongside concrete actions, about the attractiveness of healthcare work is needed to retain and attract qualified professionals to the industry [12]. Hence, it is important to focus on LPNs, who have a major role in caring for the elderly population. At present, there is a clear lack of data about a vital group of healthcare professionals, the LPNs. Although the discrepancy between the demand and supply of nurses is a global phenomenon, little research has focused on the factors which promote the attractiveness of the professional and wellbeing at work [3, 17]. Understanding the factors which affect the attractiveness of a profession and wellbeing at work are essential to workforce planning [3]; to this end, Roos et al. [18] recently performed a literature review to clarify these factors. The review produced data about the factors associated with the attractiveness of social and healthcare work from LPN perspective, which correspond well with WHO’s report “Health and care workforce in Europe: Time to act”; the authors of the report stressed that all European countries will face severe challenges in retaining healthcare professionals and outline 10 policies for strengthening the healthcare workforce [4, 18].

1.1. Theoretical Background. LPNs role as providers of care for the elderly has become increasingly important worldwide. The LPNs’ work and the role as a caregiver is emphasized in Finland, as well as with the number of employees. LPNs represent the largest group of healthcare professionals in Finland, with 89 820 LPNs registered in 2021 [19]. In the same year, registered nurses (RNs) were the second largest group of employees with 76 851 RNs in total [19]. LPNs work in various fields of social and healthcare, and especially the importance of their work is visible in long-term care settings and home care [15, 19].

In this study, a definition of licensed practical nurse (LPN) is used. The LPN profession is regulated by Finnish legislation and requires a specific education (Finnish National Agency for Education). Internationally, as described by the NCSBN, licensed practice/vocational nurses’ (LPN/VN) have a regulated education [20]. Globally, LPNs’ education has definitions, such as enrolled nurse (Australia), licensed practical nurses (Finland, USA), licensed vocational nurses (USA), and nurse associates (UK).

The demand for LPNs has rapidly grown, especially due to population ageing. According to analysis, there is shortage of 9 000 LPNs in the Finnish public sector [21]. The social and healthcare sector employed over 415 000 people in 2022, making it Finland’s largest industry [22]. By the year 2035, Finland will require over 200 000 new social and healthcare employees [23]. According to Official Statistics of Finland [22], the total number of elderly people over 75 years of age will grow rapidly, from 567 000 in 2021 to 855 000 by 2035. Finland, with a population of 5.6 million, will require a remarkably large amount of new healthcare personnel—this will require innovative strategies to ensure that the supply of workers sufficiently meets the demand.

The shortage of healthcare professionals has become a palpable problem. Already existing workforce shortages challenge nurse managers daily. Leaders in nursing are primarily responsible for the sustainable wellbeing of nursing personnel [24]. Challenges regarding the division of work with insufficient resources have a negative effect on the quality of care [15, 24]. In addition, citizens and family members have overcome worries about how general health care will be affected by these shortages [13, 17]. Strategies to resolve workforce shortages, including defining which factors promote the attractiveness of health care work, remain incomplete, yet under continuous development [1, 3, 13]. The WHO has called for more studies on the productivity of nursing professionals and the scope of practice of different professions, including LPNs, to improve the attractiveness of work [3].

Theoretical models to understand the fundamental concepts of employees' motivation, experiences, and work satisfaction have been developed at different fields of expertise. Most interestingly, the job characteristic model (JCM), the demand-control-support (DSC) model, or the theory of motivation explore and analyze the employees' experiences. The job characteristic model (JCM) implies on work characteristics (skill variety, task identity, task significance, autonomy, and feedback) and their impact on motivation, satisfaction, and performance [25]. The demand-control-support (DCS) model, instead, was developed to understand the relationship between job characteristics and employee health [26]. The theory of motivation [27] has been utilized in studies regarding healthcare workers job satisfaction, and particularly motivation and employees' attitude towards the work and work environment [28, 29]. The theory is typically applied, when investigating motivation related to work. The theory explains employees' job satisfaction/dissatisfaction to motivation. To understand the human resource experience in the context of nursing, the classic Herzberg's two-factor theory (originally developed in 1959), the theory of motivation is a well-justified framework in our study [27, 30].

There is insufficient evidence-based research into interventions for attracting and retaining healthcare workers [31]. In this study, we explore factors affecting the attractiveness of work and wellbeing at work from the LPN perspective. Furthermore, we gain insight into LPNs' work satisfaction to develop long-term work satisfaction and motivation. We explore the motivation-hygiene theory as a theoretical framework of this research to gain insight into both motivator factors and hygiene factors [27]. The theory implies that two sets of factors influence employees' motivation and work satisfaction, i.e., the motivator factors, which relate to the content of work (e.g., recognition, achievement, and responsibility) and the hygiene factors, which relate to the surrounding of work (e.g., working conditions, salary, and interpersonal relations) [27].

The theory of motivation explains that employee satisfaction, motivation, and commitment are primarily promoted by factors related to work content, such as recognition, opportunities for advancement, or responsibility [27]. Furthermore, the theory of motivation

argues that income is the most important factor in attracting professionals. However, this is not the only factor, as motivational factors related to work content and a long-term career (sense of personal achievement, promotion, and stimulating work) are also highly important [28]. Furthermore, possibilities for career progression and professional development opportunities support motivation in practice [15, 18, 32]. According to a survey distributed among Swedish mental health nursing staff's salary correlates with job satisfaction [33].

A recent study found that LPNs' intention to leave the nursing profession is correlated with both emotional exhaustion and high workload [34]. Other researchers found that the limited resources of healthcare systems mean that the division of work must be harmonized better [18]. In addition, nursing education should comprehensively describe different roles, while qualified professionals who have graduated should be afforded opportunities for continuous education [17, 35]. This would maintain a clear vision of the LPN role and hopefully improve employee retention [17]. Wellbeing at work is enhanced through active collaboration with educators and employers. Work satisfaction is improved by enabling flexible career paths and educational possibilities [36]. LPNs, for instance, have more limited opportunities for career progression and LPNs lack flexible career paths when compared to RNs [15, 35].

The WHO [36] introduced a model for workforce planning in nursing which stresses comprehensive development and understanding, with national demographical data considered a means to identify the core issues of work [36]. In line with the theory of motivation, to understand the factors affecting the attractiveness of LPNs work, these interventions should first cover roles of different professionals and also education and career options [27, 36]. Weaver et al. [15] discovered that the LPNs' and employers lack a clear vision of the LPNs' role. Furthermore, the LPNs work regularly "outside" their role, despite the regulations, due to situations in patient care [15, 18]. Challenges in delivering nursing care with insufficient human resources impacts the role of an LPN, as well as and may lead not only to a role confusion but also dissatisfaction in work-related well-being [13, 15]. An Australian literature review [17] revealed enablers and barriers to the recruitment and retention of enrolled nurses (ENs or global equivalents). A clear description of the role of an LPN affects positively to the retention and recruitment of nursing professionals [15, 17]. Confusion about the scope of practice and feelings of being undervalued negatively influence the LPNs wellbeing at work and retention instead [32]. Thus, evidence of how LPNs perceive their role is essential and important in retention of professionals [37].

Comprehensive workforce planning requires deep understanding of the core purpose of work, as well as a grasp of the current psychological and practical environment [1, 3]. Hence, healthcare professionals and nurse managers should clearly understand and state the roles of different nursing professions if care activities are to be efficiently carried out [15, 27]. Although LPNs' role is expanding, the LPNs experience role confusion and thus aspire recognition as an

important member of a care team [15]. Feeling empowered enhances wellbeing at work; for this reason, the role of an LPN must be clearly described in a way that does not merely repeat the legislation [15, 38, 39]. Unfortunately, not all of the possibilities of the LPN role are used in practice [15, 18]. A Finnish study [38] investigated LPNs', RNs', and managers' assessment of the activities of practical nurses. In line with the study of Weaver et al. [15], the results showed that other healthcare professionals need more information about the role of an LPN [38]. Healthcare leaders have the responsibility of clarifying and updating the scope and division of labor for the best outcome [15, 18, 38].

Nursing management and systematic workforce planning is crucial in retaining nursing professionals [40]. In addition, working conditions need to enable an adequate work-life balance since wellbeing at work deteriorates when the workload becomes a burden and/or there is not enough time to manage all of the necessary tasks [4, 13, 18]. Every healthcare organization is responsible for providing possibilities to all employees, as inefficient management narrows the possibilities to work in diverse and desired tasks [35]. This is important, as research has shown that an LPN is often considered second-level nursing position due to insufficient knowledge [18, 39]. Role clarification can maximize nursing professionals' capacity and capability; however, the scope of practice needs to be in line with organizational regulations and targets to improve the quality of patient care [15, 41]. A previous Australian study [42] attempted to improve the understanding of unclear professional roles by focusing on the scope of RNs' and enrolled nurses' (ENs) work. They found that the shortage of nursing professionals has transformed the LPN role to encompass more advanced nursing tasks [42]. More specifically, the current LPN role includes activities that were traditionally the responsibility of RNs, i.e., medication administration, care planning, and patient management [38, 42]. Clarification regarding the LPNs' expanding practical role is vital not only to improve quality of care but also for the wellbeing of the LPN [38]. This is not specific to LPNs, however, as other health care professionals also need more information about the LPN role [18]. Nursing management, which includes aspects of conflict management and dialogue with personnel, supports LPNs' organizational commitment [18, 43].

The division of healthcare professionals' work is also challenged by geographical reasons [44, 45]. The rural and remote areas of geographically vast countries, such as Finland, are characterized by insufficient access to healthcare services. Nursing managers face difficulties in recruiting and retaining nursing workforce due to geographical reasons and this will necessitate action plans to attract healthcare workers to rural areas [6, 45]. According to the WHO [6], national data on the size of the workforce are lacking. The growing demand for healthcare workers affords qualified professionals the freedom to choose countries with the most attractive salaries and workplaces and has led to rapid development in the international recruitment of health personnel [46]. A Canadian cross-sectional survey [45] examined intentions to leave among RNs, nurse practitioners (NPs), and LPNs; the results revealed that

organizational commitment enhanced LPNs' intention to stay, and this finding was especially relevant for rural areas. In rural areas, workforce planning is often challenging due to geographical limitations, and the healthcare system must ensure that rural professionals have similar opportunities as urban professionals [44]. This challenges leadership to find ways in ensuring that all employees, both in rural and urban areas, feel trusted and as a long-term part of the organization [37, 45]. Feeling of being trusted enhances psychological empowerment among LPNs working in elderly care [43].

Turnover among LPNs poses a major threat to elderly care [43]. Furthermore, a shortage in nursing professionals has become evident in long-term care facilities due to the increasing number of ageing residents [2]. Havaei et al. [44] demonstrated that a good work environment reduces turnover intentions among nursing professions. Furthermore, a healthy work environment is an initial factor in supporting and enhancing LPNs' organizational commitment [44]. In promoting the human resource experience, it is essential to study the factors that affect employee motivation and commitment to work [28]. Moreover, it is important to study, namely, the experiences of caregivers regarding the attractiveness of work and factors affecting attractiveness to ensure the adequacy of healthcare workforce [13].

2. Purpose and Aims of the Study

The purpose of this study is to define factors that affect LPNs' attractiveness of work and wellbeing at work. This study aims to examine the factors that affect the attractiveness of work and wellbeing at work from the LPN perspective by including both demographic (e.g., age, work experience) and attractiveness (e.g., well-functioning practices and participatory management) factors in the study.

3. Methods

In this cross-sectional study, LPNs who are registered members either of the following two unions: the Finnish Union of Qualified Social and Health Care Professionals (Tehy) and the Finnish Union of Practical Nurses (SuPer); they were emailed a link to an online survey ($n = 67\ 825$). The research utilized the checklist for Reporting of Internet E-Surveys for reporting the results [47, 48] and STROBE-checklist for cross-sectional studies [49].

3.1. Ethical Considerations. In accordance with the ethical principles of research involving human participants and the guidelines for human sciences set forth by the Finnish National Board on Research Integrity, an ethical review statement was not required in this study since information that could be used to identify a person was not collected [50]. As the research did not require a full ethical review, the University of Eastern Finland Committee on Research Ethics provided a description of the ethical review practices in Finland. Permission to use the CFGW in this study focused on LPNs was gained from a chairperson of the Finnish Nursing Association in January 2022. Participants were

given detailed information about the study prior to participation; the information document covered the aim, data collection methods, time required to complete the survey (10 min), data storage, and the researcher's (MR) contact information. Respondents were informed that submitting the survey form constitutes as an informed consent to participate in the study. Data were handled according to the EU's General Data Protection Regulation guidelines [51]. A privacy notice for scientific research was also given to respondents. In addition, all respondents were informed that participation was voluntary and responding to the survey is anonymous. Participants were not compensated for completing the survey [52, 53].

3.2. Sample and Sampling. Participants in this study were currently employed LPNs, who were registered members of the Union of Health and Social Care Professionals in Finland (Tehy) or the Finnish Union of Practical Nurses (SuPer). A large proportion of Finnish LPNs are registered members of the two trade unions for social and healthcare workers in Finland. A vast majority and, in our study, 90% ($n = 67\ 825$) of all Finnish LPNs ($n = 79\ 766$) employed in social and healthcare, are members either of the two trade unions [19].

To be included in this study, participants had to be licensed practical nurses (LPNs) with a vocational qualification in social and healthcare. In addition, participants had to be currently actively employed as an LPN in the social and healthcare field. Unemployed and nonworking LPNs were excluded. Other licensed health care professionals, e.g., registered nurses (RNs), were also excluded from this study. The eligibility of LPNs was filtered in advance via cooperation with the email registry holders (Tehy and SuPer). All eligible 67 825 LPNs were invited to participate online via e-mail. In total, 20 033 invitees opened the survey; 72% ($n = 14\ 312$) of those started filling the survey and 54% ($n = 10\ 848$) completed the entire survey.

3.3. Data Collection. Emails with a link to the online survey (in Finnish) and information about the study were sent to invitees' email addresses in the registries of the two previously described trade unions on May 10th, 2022. The online survey was accessible for two weeks (10.5.-25.5.2022). A reminder message was sent to all of the email addresses after one week. The questionnaire took about 10 minutes to complete. A total of 10 848 responses were received from LPNs and were included in the study.

3.4. Survey Instruments and Variables. The survey utilized the Criteria for a Good Workplace (CFGW) instrument and questions concerning background variables. CFGW is a structured 44-item questionnaire managing wellbeing at work, with a core group (wellbeing at work) and six subgroups, which are categorized into seven theme-based subgroups. The six subgroups are well-functioning practices, participatory management, rewarding work, development of expertise, quality of care and reconciling work, and private life (Figure 1).

The core group, wellbeing at work, includes all of the subgroups as an integral part of the LPN's wellbeing at work within the CFGW. As a core group, wellbeing at work, acts as a central group for wellbeing initiatives, the subgroups. Wellbeing at work is a representative group and implies that other six groups are divisions that fall under the representation of the main group. The subgroups are specialized units with 5–9 items each to describe their specific theme. A five-point Likert scale is used to indicate the level of importance or agreement (i.e., lower values indicate lower importance or agreement, while higher values indicate higher importance or agreement).

The CFGW allows comprehensive exploration of LPNs wellbeing at work, with the core group, and the subgroups addressing specific aspects for understanding the LPN's wellbeing at work and factors enhancing attractiveness of work. (Figure 1).

The CFGW has been developed and conducted bi-annually by the Finnish Nursing Association for its members (RNs) since 2010. The internal validity of the CFGW has been tested, although the result of the test of validation has not been published. In our study, the CFGW was modified in 2022 and the survey aimed at LPNs for the first time. In this study, we collected an online survey data to explore LPNs' wellbeing at work. We modified the questionnaire CFGW to assess LPNs' wellbeing at work and adapted the CFGW to be suitable for LPNs with the input of a group of specialists. We pilot tested the questionnaire on vocational social and healthcare students ($n = 13$). Proofreading of the questionnaire was completed in collaboration with a vocational teacher [54].

Concerning background variables, this survey included questions about the participant's gender, age, education, employment contract (full- or part-time), type of work shift, work experience in social and healthcare and in the current unit, sector of work, number of personnel, and work unit. The background data were later split into groups for statistical analysis. Age had six groups, each with a five-year interval and ranging from 25 to 65 years. Type of work shift had the following four groups: morning shift on weekdays and weekends; two-shift work; three-shift work; and only night shifts. Work experience in social and healthcare and in the current unit had the following seven groups: 1 year or less; 2–5 years; 6–10 years; 11–15 years; 16–20 years; 21–30 years; and 31 or more years. Sector of work consisted of two groups: public and private sector. Number of personnel had the following three groups: less than 10; 10–30; and more than 30.

The data were collected, and survey was presented to invitees using Webropol [55].

3.5. Statistical Analysis. A detailed plan for the statistical analysis was developed in collaboration with a statistician prior the starting of the study. The power analysis indicated that observing a difference of 0.1 between two-group averages would require both groups to have a sample size $n \geq 400$ (Figure 2). Consequently, only the groups with at least 400 observations were included in the data analysis

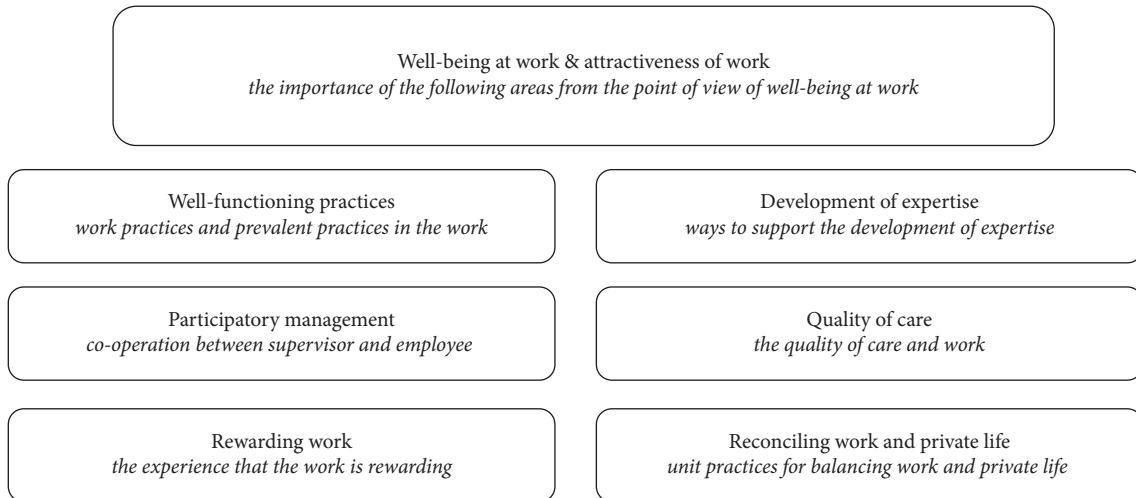


FIGURE 1: The core group and subgroups of the criteria for a good workplace (CFGW).

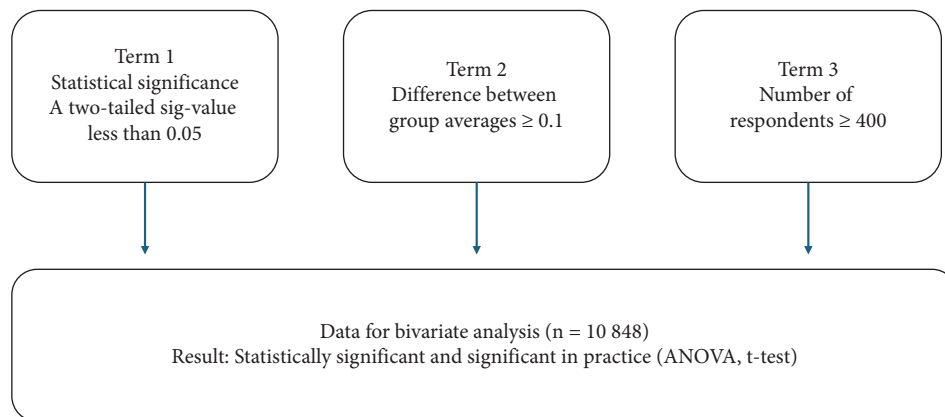


FIGURE 2: Terms of a result being statistically significant and significant in practice (sp) based on the initial power analysis.

regarding *t*-test, analysis of variance (ANOVA), and CFA factor scores. Following data collection, sum variables representing the arithmetic average, were calculated for each subtopic. The background and sum variables were detailed using descriptive statistics. The internal consistency of each subgroup was assessed by calculating Cronbach's alpha.

Confirmatory factor analysis (CFA) was conducted using AMOS software (IBM, Armonk, NY). The relationships between background variables and sum variables were studied using analysis of variance (ANOVA) and *t*-tests. Due to large number of observations ($n = 10\,848$), which can result in large amount of statistically significant results, we applied the concept of "significant in practice (sp)" to identify results that are not only statistically significant but also relevant to the study aims. The minimum difference regarding significance in practice (sp) in means was set at 0.1, determined after a discussion among the authors. Thus, an effect size of at least 0.125 was required for a result to be considered significant in practice if the *p* value is below threshold. An ANOVA or *t*-test result which indicated a statistically significant between-group difference (that was in line with difference ≥ 0.1) was considered as both statistically significant and significant in practice.

Descriptive statistics, including frequencies, percentages, mean values, and standard deviations, were used to describe the background variables. There were only four missing values out of 10 848 when calculating the sum variables, making imputation unnecessary. The normality of each sum variable was evaluated by assessing the mean value, standard deviation, skewness, and visual interpretation of histograms. All sum variables, except wellbeing at work, demonstrated a normal distribution. According to the central limit theorem, a sum of independent random variable is considered to normally distributed when the sample size is high [56, 57]. The central limit theorem's speed of convergence was evaluated using simulation for the wellbeing at work, and it was found out that 2000 observations is enough to make test statistics normally distributed.

Sum variables were calculated to study the attractiveness of work and wellbeing at work from the perspective of LPNs. Cronbach's alpha was calculated to determine whether all items grouped under a sum variable showed sufficient internal consistency. A Cronbach's alpha value over 0.70 is generally considered acceptable [58], with values in this study ranging from 0.739 to 0.915 (Table 1). No individual item had a Cronbach's alpha value exceeding that of the sum

TABLE 1: Descriptive statistics of the sum variables well-functioning practices, participatory management, rewarding work, development of expertise, quality of care, and reconciling work and private life, including the calculated Cronbach's alpha value.

<i>n</i> = 10 848	m (Sd)	Cronbach's alpha (*if item deleted)
Wellbeing at work and attractiveness of work: the importance of the following areas from the point of view of your wellbeing at work (a)	4.36 (0.64)	0.876
Well-functioning practices	4.55 (0.740)	*0.851
Participatory management	4.29 (0.868)	*0.858
Rewarding work	4.45 (0.845)	*0.846
Development of expertise	4.07 (0.899)	*0.862
Quality of care	4.61 (0.713)	*0.851
Reconciling work and private life	4.59 (0.803)	*0.864
Well-functioning practices: work practices and prevalent practices in the work unit (b)	3.07 (0.84)	0.846
The goals and the core purpose for my work have been defined	4.00 (0.89)	*0.844
Work processes are regularly evaluated regularly together	2.97 (1.14)	*0.809
Personnel recruitment is based on the competence need of the work community	2.74 (1.18)	*0.816
The practices of high-quality student guidance have been agreed upon	2.98 (1.17)	*0.824
Existence of systematic activities that support wellbeing at work	2.54 (1.19)	*0.804
I give and receive feedback	3.18 (1.08)	*0.824
Participatory management: co-operation between supervisor and employee (b)	3.13 (1.00)	0.915
My supervisor has a clear understanding of what my work is	3.57 (1.23)	*0.907
As an employee, I am encouraged to participate in planning and decision-making	3.12 (1.22)	*0.901
Decision-making is open	2.79 (1.20)	*0.897
Problem situations are dealt with quickly	2.74 (1.23)	*0.899
The supervisor supports the renewal of working methods	3.26 (1.20)	*0.898
There are open and confidential relations between the supervisor and me (as an employee)	3.63 (1.22)	*0.902
Consistent rules are followed in my work unit; same rules for everyone at all times	2.81 (1.32)	*0.907
Rewarding work: the experience that the work is rewarding (b)	3.00 (0.83)	0.815
I can do my job well	3.46 (1.09)	*0.781
I feel that my work is respected	3.09 (1.17)	*0.758
I find work empowering (energy, dedication, and immersion in work)	3.02 (1.16)	*0.737
My work is meaningful even though I am sometimes stressed and tired	3.59 (1.05)	*0.763
The salary increases as the demands of the tasks increase	1.64 (0.97)	*0.838
Development of expertise: ways and means to support the development of expertise (b)	3.14 (0.79)	0.834
Orientation is systematic and sufficient	2.67 (1.12)	*0.812
Division of tasks is based on employee training (job title)	3.08 (1.18)	*0.821
The division of tasks is based on the skills of the employees	3.06 (1.14)	*0.812
I have the opportunity to develop my skills	3.35 (1.13)	*0.808
I use the latest researched and reliable information in my work	3.48 (0.99)	*0.818
I prepare for the development discussion in advance	3.44 (1.24)	*0.825
Development discussions are held regularly with the employee	3.06 (1.47)	*0.823
The most experienced employees act as mentors and transfer knowhow in the work community	3.23 (1.17)	*0.816
I get job guidance if necessary	2.93 (1.31)	*0.817
Quality of care: the quality of care and work (b)	3.37 (0.75)	0.773
I evaluate the patient's/client's treatment using existing quality criteria	3.59 (1.02)	*0.754
The number of personnel and professional structure correspond to the demands of the work	2.49 (1.21)	*0.744
The skills of practical nurses correspond to the demands of the work	3.66 (1.07)	*0.745
I use evidence-based treatment and work methods	3.73 (0.98)	*0.747
Treatment equipment and tools are up to date	3.40 (1.13)	*0.730
I can work in a manner that ensures patient safety	3.34 (1.14)	*0.717
Reconciling work and private life: unit practices for balancing work and private life (b)	3.34 (0.81)	0.739
I have enough time to do my work	2.94 (1.30)	*0.734
When planning working hours, individual needs are considered	3.24 (1.28)	*0.678
Transition to study, work rotation, and sabbatical leave, as well as part-time retirement, is possible	3.26 (1.15)	*0.680
Everyone has the right to family leave and to care for a sick child or loved one	3.89 (1.05)	*0.667
Fathers are also supported in using family leave	3.34 (0.99)	*0.705

a: level of importance (1 = not at all important, 5 = extremely important). b: level of agreement (1 = strongly disagree, 5 = strongly agree). *n* = amount of respondents. *m* = mean. *sd* = standard deviation. Cronbach's alpha: *if item deleted.

variable, so there was no reason to delete any items. One item, “the salary increases as the demands of the tasks increase” (item 24), would have resulted in a higher value for the sum variable if deleted ($\alpha = 0.84$ vs. $\alpha = 0.82$ if retained). Nevertheless, this item was retained in the survey since the sum variable already showed good internal consistency ($\alpha = 0.82$).

The statistical analysis yielded seven internally consistent sum variables for items of the CFGW. The sum variables describe different aspects of the attractiveness of work and wellbeing at work in social and health care, namely, wellbeing at work, well-functioning practices, participatory management, rewarding work, development of expertise, quality of care, and reconciling work and private life (Table 1). Regarding the bivariate associations, homoscedasticity of variances was tested using Levene’s test. If heteroscedasticity was detected, Welch’s ANOVA was applied; otherwise, traditional ANOVA was used. In these analyses, which were performed in IBM SPSS (version 27.0, IBM, Armonk, NY), the threshold for statistical significance was set as $p \leq 0.05$.

In addition, we calculated average interitem correlation, average item-total correlation, as well as split-half reliability and composite reliability. These quantities can be found in Appendix (Supplementary file 2).

4. Results

4.1. Demographic Characteristics of Licensed Practical Nurses (LPNs). The response rate was 16% ($n = 10\,848$). Majority of the respondents were women ($n = 10\,173$, 94%). The respondents’ ages were divided into six groups. Over half of the LPNs were over 45 years old (54%), while a quarter were over 55 years old (25%). In contrast, a minority of respondents were under 25 years old (5%). Most of the respondents had work experience of between 6–10 (22%) or 11–15 years (19%) in social and healthcare. Moreover, 27% of the LPNs had over 20 years of work experience in social and healthcare. It was most common for the respondents to have worked at the current unit for 2–5 years (32%), while one fifth of the respondents had worked at the current unit for less than one year (Table 2).

Most of the work units had between 10–30 employees (57%), while 17% of LPNs worked in smaller work units, with less than 10 employees. The participating LPNs mostly worked in enhanced service housing for the elderly (24%) or domiciliary care (17%), and three quarters of the respondents were employed by the public sector (74%). The rest of the LPNs (26%) were working in the private sector. Of the respondents, six out of seven (86%) were educated as a qualified LPN, while the rest (14%) had completed some other vocational education (e.g., basic nurse). Most of the participating LPNs were working full-time (81%), and it was most common to have work organized over two (38%) or three shifts (37%) (Table 2).

4.2. Results from Bivariate Associations and Analysis of Variance. Based on the analyses, three sum variables, namely, well-functioning practices, rewarding work, and development of expertise, were most often significantly associated with independent background variables. The results revealed that the core group and dependent variable, wellbeing at work ($m = 4.36$), including its six subgroups (well-functioning practices, participatory management, rewarding work, development of expertise, quality of care, and reconciling work and private life), are extremely important for LPNs’ perceptions of the attractiveness of work. Furthermore, subgroups quality of care and reconciliation of work and private life have the highest averages in wellbeing at work. (Table 1). Bivariate analyses, ANOVA, and *t*-tests were conducted to identify the variables that were independently associated with the CFGW sum scores. In this study, the presented statistically significant results are both statistically significant and meaningful in practice (mp) (Table 3 and Figure 2). Associations between the background and sum variables were assessed using bivariate analysis, analysis of variance (ANOVA), and *t*-tests. When only groups with 400 or more responses were included in the analyses, 44 of the 77 pairwise association tests demonstrated statistically significant associations that were also deemed significant in practice (Table 3 and Figure 2).

When evaluating the LPNs’ experience related to rewarding work, the LPNs evaluate work rather rewarding in other areas, except the salary. Furthermore, LPNs’ salary does not increase as the demands of the tasks increase ($m = 1.64$) (Table 1). Well-functioning practices need improvements according to the LPNs. Regular and joint evaluation of work processes could be improved ($m = 2.97$). Recruitment is not fully based on the competence need of the work ($m = 2.74$). Practices related to the high-quality student guidance have not been effectively agreed in the work unit ($m = 2.98$). Also, systematic activities, which support wellbeing at work, need improvement ($m = 2.54$). (Table 1). Furthermore, participatory management requires improvements in practice according to the results. LPNs strive for more open decision-making ($m = 2.79$). Furthermore, dealing effectively with problem situations requires improvements ($m = 2.74$). Consistency in following the rules needs enhancement in practice according to the results ($m = 2.81$). (Table 1). To support the LPNs’ development of expertise and empowerment, systematic and sufficient orientation is important ($m = 2.67$). Furthermore, LPNs’ work-related guidance is not sufficiently available for those in need ($m = 2.93$). The quality of care and work can be improved with corresponding better the number of personnel and professional structure to the demands of the work ($m = 2.49$).

All the following associations had the following *p* value: $p < 0.001$. Well-functioning practices associated with education, full-time work, type of work shift, age, work experience in social and healthcare and in the current unit, work

TABLE 2: Characteristics of respondents ($n = 10\ 848$).

Background variable. $N = 10\ 848$	<i>f</i>	%
Gender		
Female	10 173	93.8
Male	622	5.7
Other	12	0.1
I do not want to tell	41	0.4
Age (years)		
Less than 25	517	4.8
25–35	1992	18.4
36–45	2473	22.8
46–55	2985	27.5
56–65	2866	26.4
Over 66	15	0.1
Education		
Licensed practical nurse (LPN)	9278	85.5
Basic nurse*/or other secondary/vocational education in social and healthcare	1559	14.4
LPN with an apprenticeship training of social and healthcare working in the field	11	0.1
Working full-time (100%)		
No	2083	19.2
Yes	8765	80.8
Type of work shift		
Morning shift on weekdays and weekends	2247	22.6
Two-shift work (morning and evening shift)	4071	37.5
Three-shift work (morning, evening, and night shifts)	4025	37.1
Only nightshift	305	2.8
Work experience in social and healthcare (in years)		
1 or less	235	2.2
2–5	1787	16.5
6–10	2359	21.7
11–15	2052	18.9
16–20	1517	14.0
21–30	1565	14.4
31 or over	1333	12.3
I mainly work in the following sector		
In the public sector (municipality, city, union of municipalities, state, and personnel leasing)	8005	73.8
In the private sector (company, foundation, organization, other private employer, own company, and personnel leasing)	2843	26.2
Work experience in the current work unit (in years)		
1 or less	2145	19.8
2–5	3520	32.4
6–10	2252	20.8
11–15	1364	12.6
16–20	736	6.8
21–30	470	4.3
31 or more	361	3.3
Number of personnel in the work unit		
Less than 10	1815	16.7
10–30	6169	56.9
More than 30	2864	26.4
Work unit		
Serviced housing: elderly	838	7.7
Enhanced service housing: elderly	2559	23.6
Domiciliary care	1875	17.3
Disability services	914	8.4
Care unit of a health center	449	4.1
Early childhood education	1233	11.4
Specialized medical care	752	6.9
Mental health and substance abuse unit	420	3.9
Reception work	175	1.6

TABLE 2: Continued.

Background variable. <i>N</i> = 10 848	<i>f</i>	%
School	101	0.9
Child protection	80	0.7
Family care	8	0.1
Equipment maintenance	4	0.0
Laboratory	90	0.8
First aid	23	0.2
Reserve staff	91	0.8
Personal assistant	14	0.1
Oral healthcare	398	3.7
X-ray	7	0.1
Virtual healthcare	18	0.2
I work in several different offices	58	0.5
Other	741	6.8

f = frequency, *basic nurse: professional title for licensed practical nurses before education reform during 1993.

unit, and professional pride. Rewarding work, on the other hand, was significantly associated with education, full-time work, work experience in social and healthcare and in the current unit, work unit, and professional pride. Furthermore, development of expertise was found to be significantly associated with education, full-time work, type of work shift, age, work experience in social and healthcare and in the current unit, number of personnel, work unit, and professional pride, while wellbeing at work was significantly associated with gender, age, and professional pride. (Table 3).

The independent variable full-time work demonstrated statistically significant associations with most of the sum variables (5 out of 7). LPNs who worked full-time were characterized by consistently higher averages across all the sum variables when compared to LPNs working part-time. For instance, LPNs who work full-time had significantly higher values for the sum variables of well-functioning practices ($m = 3.1$), participatory management ($m = 3.16$), rewarding work ($m = 2.99$), development of expertise ($m = 3.18$), and quality of care ($m = 3.4$) than LPNs working part-time. (Tables 1, 3). The LPNs working full-time evaluate the quality of care ($p \leq 0.001$, $m = 3.4$) as the most important aspect of work; rewarding work ($p \leq 0.001$) showed a statistically significant difference relative to responses from part-time workers but had the lowest average value ($m = 2.99$) (Table 3).

Age and work experience (both in social and healthcare as well as the current work unit) were associated with all the sum variables interestingly in a J-curve manner; an exception was well-being at work. Hence, people with only a few years of experience, as well as younger employees, show higher averages than people with 2–15 years of experience or between the ages of 25–55; this trend then reverses later, with the highest average values often seen for people who are nearing retirement. (Table 3).

Respondents with a vocational education other than a licensed practical nurse demonstrated systematically higher averages across all the sum variables when compared to LPNs. Among these respondents, the development of expertise was statistically significantly associated with the independent variable education ($p \leq 0.001$) and experienced as the most important aspect ($m = 3.28$). Work unit and all the sum variables, with the exception of wellbeing at work, demonstrated statistically significant associations. Furthermore, the results indicated that the opinions of the attractiveness of work were rather similar across all units. For instance, enhanced service housing and domiciliary care, which represented most of the respondents, showed similar results as the other units. The independent variable, number of personnel, was significantly associated with rewarding work ($p \leq 0.001$), quality of care ($p \leq 0.001$), and reconciling work and private life ($p \leq 0.001$). LPNs who worked in small units (less than 10 employees) demonstrated higher average values for the sum variables relative to LPNs working in larger units, which indicates higher satisfaction in smaller units (Table 3).

Interestingly, wellbeing at work showed exceptionally high averages ($m = 4.36$). This indicates that wellbeing at work is, in the opinion of LPNs, the most important aspect of attractiveness of work. (Table 1). The individual variables gender ($p \leq 0.001$) and age ($p \leq 0.001$) were significantly associated with wellbeing at work (Table 3). Furthermore, the subgroups' high quality of care and reconciliation of work and private life showed the highest average values (Table 3). The independent variable professional pride was significantly associated with all seven sum variables, the core- and subgroups. The LPNs who reported feeling professional pride, which was 77% of respondents, had higher average values for all seven sum variables when compared to LPNs who either reported not feeling professional pride or being unsure (Table 3).

TABLE 3: Results from bivariate analyses and analysis of variance (ANOVA and *t* test).

Background variables	<i>n</i>	Wellbeing at work		Well-functioning practices		Participatory management		Rewarding work		Development of expertise		Quality of care		Reconciling work and private life	
		Mean	P * sp	Mean	P * sp	Mean	P * sp	Mean	P * sp	Mean	P * sp	Mean	P * sp	Mean	P * sp
Gender															
Female	10173	4.44	<0.001 * sp	3.07	0.323	3.13	0.299	2.96	0.0651	3.14	0.964	3.37	0.342	3.33	0.046 ¹
Male	622	4.27		3.11		3.19		2.92		3.15		3.39		3.41	
Education															
LPN	9278	4.42	0.281 ¹	3.05	<0.001 ¹ * sp	3.12	0.029 ¹	2.93	<0.001 ¹ * sp	3.12	<0.001 ¹ * sp	3.36	0.001	3.32	0.001 ¹
Other***	1559	4.44		3.20		3.19		3.10		3.28		3.43		3.41	
Working full-time															
No	2083	4.40	0.016	3.00	<0.001 * sp	3.02	<0.001 * sp	2.83	<0.001 * sp	3.01	<0.001 * sp	3.26	<0.001 * sp	3.32	0.488
Yes	8765	4.43		3.10		3.16		2.99		3.18		3.40		3.34	
Type of work shift															
Morning shift	2447	4.42	0.095	3.16	<0.001 * sp	3.22	<0.001 ¹	3.10	<0.001	3.23	<0.001 * sp	3.43	<0.001	3.47	<0.001 * sp
Two shift	4071	4.44		3.05		3.13		2.93		3.11		3.33		3.25	
Three shift	4025	4.42		3.04		3.10		2.90		3.13		3.37		3.32	
Nightshift	305	4.35		3.00		2.92		3.04		3.02		3.33		3.58	
Age (years)															
<25	517	4.26	<0.001 ¹ * sp	2.91	<0.001 * sp	3.18	0.029	2.79	<0.001 * sp	3.13	<0.001 * sp	3.35	<0.001 * sp	3.31	0.036
25-35	1992	4.42		2.92		3.09		2.76		3.04		3.30		3.36	
36-45	2473	4.42		3.03		3.10		2.89		3.11		3.32		3.34	
46-55	2985	4.45		3.14		3.13		3.03		3.18		3.40		3.31	
56-65	2866	4.44		3.17		3.17		3.12		3.22		3.43		3.35	
Work experience															
≤1	235	4.36	<0.001 ¹	3.19	<0.001 * sp	3.43	<0.001 ¹ * sp	3.19	<0.001 ¹ * sp	3.27	<0.001 * sp	3.50	<0.001 * sp	3.43	<0.001 * sp
2-5	1787	4.37		2.98		3.14		2.89		3.10		3.36		3.31	
6-10	2359	4.42		2.98		3.07		2.85		3.07		3.32		3.31	
11-15	2052	4.45		3.06		3.12		2.91		3.10		3.34		3.32	
16-20	1517	4.45		3.11		3.13		2.99		3.17		3.36		3.31	
21-30	1565	4.46		3.14		3.12		3.05		3.20		3.41		3.36	
31 or over	1333	4.45		3.23		3.21		3.13		3.30		3.43		3.42	
Work experience, current unit															
≤1	2145	4.39	0.037 ¹	3.11	<0.001 ¹ * sp	3.31	<0.001 * sp	3.07	<0.001 ¹ * sp	3.17	<0.001 ¹ * sp	3.41	<0.001 * sp	3.41	<0.001 * sp
2-5	3520	4.42		3.03		3.11		2.91		3.11		3.36		3.33	
6-10	2252	4.44		3.02		3.04		2.86		3.09		3.31		3.29	
11-15	1364	4.45		3.08		3.05		2.93		3.15		3.34		3.29	
16-20	736	4.46		3.08		3.08		3.03		3.21		3.38		3.34	
21-30	470	4.43		3.22		3.17		3.13		3.29		3.48		3.36	
31 or more	361	4.45		3.28		3.2		3.19		3.35		3.52		3.40	

TABLE 3: Continued.

Background variables	n	Wellbeing at work		Well-functioning practices		Participatory management		Rewarding work		Development of expertise		Quality of care		Reconciling work and private life	
		Mean	P * sp	Mean	P * sp	Mean	P * sp	Mean	P * sp	Mean	P * sp	Mean	P * sp	Mean	P * sp
Sector of work			0.694		0.500		0.028		0.189		0.001		0.994		<0.001
Public sector**	8005	4.43		3.07		3.12		2.95		3.16		3.37		3.32	
Private sector**	2843	4.43		3.08		3.17		2.98		3.1		3.37		3.38	
Number of personnel in the work unit			0.169 ¹		0.841 ¹		0.021		<0.001 ¹ * sp		0.034 ¹		<0.001 ¹ * sp		0.002 ¹ * sp
Less than 10	1815	4.4		3.07		3.15		3.06		3.12		3.44		3.37	
10-30	6169	4.43		3.07		3.15		2.94		3.16		3.36		3.35	
More than 30	2864	4.44		3.06		3.09		2.93		3.12		3.34		3.29	
Work unit			0.130 ¹		<0.001 ¹ * sp		<0.001 ¹ * sp		<0.001 ¹ * sp		<0.001 ¹ * sp		<0.001 ¹ * sp		<0.001 ¹ * sp
Serviced housing	838	4.41		3.01		3.06		2.87		3.04		3.29		3.24	
Enhanced service housing	2559	4.44		2.97		3.01		2.82		3.03		3.29		3.26	
Domiciliary care	1875	4.44		2.95		3.03		2.91		3.01		3.25		3.1	
Disability services	914	4.4		3.2		3.28		3.07		3.23		3.51		3.56	
Care unit of a health center	449	4.4		3		3.05		2.81		3.12		3.27		3.24	
Early childhood education	1233	4.4		3.18		3.35		3.02		3.28		3.34		3.44	
Specialized medical care	752	4.43		3.22		3.21		3.08		3.36		3.51		3.42	
Mental health and substance abuse unit	420	4.46		3.2		3.24		3.06		3.27		3.45		3.53	
Reception work	175			3.1		3.08		3.19		3.21		3.53		3.49	
Oral healthcare	398	4.43		3.14		3.1		3.12		3.28		3.72		3.41	
Other	741	4.5		3.18		3.21		3.12		3.21		3.48		3.48	
Do you feel professional pride as an LPN			<0.001 ¹ * sp		<0.001 ¹ * sp		<0.001 ¹ * sp		0.000 ¹ * sp		0.001 ¹ * sp		0.001 ¹		<0.001 ¹ * sp
No	2398	4.39		2.70		2.74		2.37		2.77		3.02		3.06	
I cannot say	2307	4.36		2.96		3.02		2.79		3.04		3.27		3.25	
Yes	6143	4.47		3.26		3.32		3.25		3.33		3.54		3.48	

¹ = ANOVA with Welch's ANOVA. * sp = significant in practice. (i) A two-tailed *p* value less than 0.05. (ii) Limit value 0.1 (difference between mean values $\leq 0.1 + n > v400$). **Public sector: municipality, city, union of municipalities, state, and personnel leasing. ***Private sector: company, foundation, organization, other private employer, own company, and personnel leasing. ****Basic nurse: professional title for licensed practical nurses before education reform in 1993.

Structural validity was evaluated using CFA, with the results presented in more detail in the Supplementary material (Supplementary file 1).

5. Discussion

This study has identified factors which affect the attractiveness of work and wellbeing at work from the LPN perspective. Interestingly, we found out that wellbeing of the LPNs showed exceptionally high averages. This finding supports our study aims and indicates that wellbeing at work is, in the opinion of LPNs, the most important factor of attractive work.

LPNs' empowerment and feeling of rewarding work is vital in wellbeing at work in social and healthcare. Notably, according to the results, LPNs' wellbeing at work is the most important factor of attractive work. Furthermore, the results of this study show that nurse managers' actions in systematic supporting of the LPNs' wellbeing at work need improvement in practice. The individual variable age was significantly associated with wellbeing at work. This finding indicates interestingly that young and older LPNs have similarities in regarding wellbeing at work. Furthermore, the subgroups high quality of care and reconciliation of work and private life showed the highest average values.

According to the results of this study, improvements in salaries are an important element in enhancing the feeling of rewarding work for LPNs. A recent Taiwan study showed that high salary lowers the risk of turnover, especially among newly employed nurse aids [59]. Low salary is major reason for newly licensed registered nurses for leaving the current position as well [60]. Low salary enhances LPNs' dissatisfaction at work and creates a risk, as well as for the LPNs' retention in the workplace [17]. Salary is not merely the only factor, which increases LPNs' rewarding work. Instead, the results show that nursing managers should improve actively all areas of the LPNs' wellbeing at work in practice.

This study has clarified the subareas which most impact LPNs' perceptions of the attractiveness of work. LPNs experience the work rewarding in many areas as well. The LPNs' experience, for instance, that they have the possibility to do the work well and that their work is respected. The results imply that nursing managers should take active actions to maintain the LPNs' perceived feeling of being respected and further improve all areas of rewarding work in practice. In line with Loes and Tobin [43], feeling of being trusted enhances psychological empowerment among LPNs working in elderly care. The results support the fact that nursing managers should work actively and find ways to improve LPNs' salary to improve the attractiveness of work. "Out of the box" strategies, alongside with better salaries, to improve the work environment are essential in overcoming nursing shortages [61].

The WHO has stated that national healthcare systems must have sufficient capacity and quality [3]. However, equal healthcare coverage requires a qualified workforce that meets the demand for services [5]. LPNs' perceptions of the factors that contribute to the attractiveness of the professional has not previously been studied; this current research, a large-scale nationwide study, contributes to closing this knowledge gap

by including LPNs from various care settings, which is important as LPNs represent the largest group of professionals in elderly care in Finland. On an international level, the LPN role must be clarified, especially in the context of elderly care, to develop healthcare [34]. Previous studies have included a relatively small number of participants and are typically limited to RNs or specific contexts [13, 17]. A shortage of healthcare professionals is inevitable [1]. The WHO [3] outlines that major investments in healthcare systems are needed. Furthermore, it is important to consider that 90% of the nursing workforce is made up of women [3], as in our study. In addition, it is typical that nursing professionals earn salaries that are below the average wage of the country [3]. The results in this study also indicated that LPNs feel that their salaries are not in line with the tasks that they perform. According to the results, the LPNs' salary does not increase as the demands of work grow.

According to Herzberg's two-factor theory of motivation-hygiene, salary as one of the hygiene factors influences employees' dissatisfaction at work. An employee's motivation can be enhanced by factors called motivation factors, which are related to the content of work [27]. However, the reported results are not completely in accordance with the classic theory of motivation. Previous study, which was aimed at mental health nursing personnel, found a correlation between salary and job satisfaction [35]. In this study, according to the LPNs, all the factors which positively influence personal wellbeing are extremely important in work related attractiveness. In addition, Aiken et al. stated that personnel shortages can be tackled using simple interventions, such as career advancement possibilities and evidence-based human resource management [13]. Interestingly, LPNs evaluated that all aspects of wellbeing at work (e.g., well-functioning practices, rewarding work, and participatory management) are extremely important for their personal wellbeing, which is in line with Aiken et al. [13]. Furthermore, LPNs evaluated quality of care as the most important individual factor in this study.

The findings underline that actions which promote wellbeing at work are crucial to retaining healthcare professionals. The results agree with what was reported by Aiken et al., more specifically, widespread dissatisfaction among nurses regarding patient safety and nursing care. In addition, nurses from several countries, including Finland, only judged the quality of care as poor or fair [13]. The results from this study show that LPNs prioritize patient safety and high-quality care. Also, the results indicate the nurse managers to lead more effectively high-quality student guidance and orientation processes in practice. Previous research underlines that each healthcare role, including the LPN, should have a clearly defined scope of practice if a high-quality care is to be provided [15, 42].

Based on the results, the attractiveness of work was defined based on six work-related areas, namely, well-functioning practices, participatory management, rewarding work, development of expertise, quality of care, and reconciliation of work and private life. Together, these form a structural basis for the LPNs wellbeing and can be utilized in managing the wellbeing.

Interestingly, the youngest and oldest LPNs gave similar evaluations of which factors most affect wellbeing and attractiveness of work. These respondents also gave the highest averages for current wellbeing and attractiveness of work based on the assessed subareas. Especially, young and older LPNs are a valuable resource in managing the shortfall of healthcare personnel [15, 60]. Furthermore, investments in staffing in nursing homes improve the quality of care [13, 62]. Furthermore, the responses of inexperienced and experienced LPNs showed similar trends in this study. Also, LPNs working in small units reported higher average values than peers in larger work units. The LPNs' feeling of professional pride showed a positive association with all of the wellbeing subareas. Results indicate that improving LPNs' feeling of professional pride can significantly promote the attractiveness of work and have a positive effect on the retention. In addition, leaders in nursing should improve well-functioning practices by improving the evaluation of work processes together and regularly with the LPNs.

Although this study focused on the LPN perspective, the results can be generalized to other instances in which there is a shortage of healthcare professionals. The results provide evidence that the LPNs would support any actions by nurse leaders that would improve the quality of healthcare. A recent literature review by Roos et al. showed that the work-related attraction factors do exist and can be measured [18]. The present study, which focused on LPNs' perceptions, provided unique insight into LPNs' perceptions of work-related wellbeing and the attractiveness of their profession. The findings of our study underline the importance of wellbeing of the LPNs as highly supportive element in developing the attraction of work in social and healthcare.

6. Strengths and Limitations

This study and its results have several strengths and limitations. One significant strength is the detailed modification of the CFGW questionnaire by a group of specialists, ensuring its suitability for LPNs. In addition, we successfully involved LPNs on a large scale, which is notable compared to previous studies [34]. The CFGW questionnaire demonstrated acceptable internal consistency ($\alpha = 0.739\text{--}0.915$), supporting the reliability of our results [63]. In this study, we utilized the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) to improve the quality of the online survey [47].

Response rates for online surveys can vary widely from 25–35% [58], while our study reached merely 16% but the completion rate and participation rates were acceptable, 54% and 72%, respectively [47]. We succeeded to invite over 90% of the target population to our study and received 10 848 in total. Thus, the data have a significant amount and portion of LPNs, which allows us to study many aspects of the phenomenon of our interest. The results of this study have potential to be generalized in Finland and potentially in other countries with similar healthcare setting. Information about the nonrespondents is not available, and this weakens the generalizability of the results [64].

We consider the response rate (16%) to be eligible for assessing relationships between different variables in these data. When interpreting, for example, means, the reader should not take them as precise as they would be if we had much higher response rate. Instead, there may be bias in the means but that does not necessarily mean that there is bias in the relationships of variables. In this study the usage of sum variables, representing average of multiple items, does reduce overall bias. For example, if one item had some bias, it will not play large role in the sum variables. Furthermore, the bias in the relationships of different variables would be present only if nonresponse would occur highly associated differently with one category of a background variable. For example, if we want to know if male and female LPNs report their wellbeing at work to be on the same level on average, it is enough that willingness to participate is same for men and women with similar wellbeing at work.

To enhance the response rate, multiple approaches were included. First, the number of questionnaire items was considered when selecting an instrument. The modified questionnaire (CFGW) includes a moderate number (44 in total) in line with recommendations [47, 65]. Second, a reminder notification was sent to respondents after one week, which can positively influence the response rate [64, 66]. Respondents were also able to review and change their answers before submitting likely enhancing the participation rate [47, 65]. Furthermore, all the survey responses were completely anonymous; one limitation regarding the anonymity is that one respondent may provide duplicate responses if a respondent uses another browser. However, in online survey, this is very unlikely [47, 55]. To ensure that duplicate answers were minimized, an IP check setting was selected prior to sending out the first emails.

This survey was distributed in May, which is the first month of the vacation period in Finland and this could negatively influence the response rate. Furthermore, the LPNs who received the survey are registered members of either of the two main trade unions for nursing personnel in Finland and pay the membership fee, which could improve participation. The survey was distributed about two years after the start of the COVID-19 pandemic, which was a strong burden for healthcare personnel and their wellbeing at work [9]. As such, it could mean that personnel would be more open to sharing their assessments of work attractiveness and wellbeing. Furthermore, the two main nurses' trade unions and the municipal and welfare area employers had strong disagreements during the spring 2022 in Finland. This resulted in nurses' trade unions giving a large strike warning in March 2022, which included up to 40 000 RNs and LPNs [67, 68]. In response, the Finnish Ministry of Social Welfare and Health ratified a law in April to ensure immediate patient safety in light of the actions of trade unions [69]. These actions most likely affected LPNs' motivation to change the healthcare system in Finland, which was in crisis, and could be expected to have positively affected the response rate. However, we do not have similar national data regarding the LPNs, which strengthens the value of our findings.

The results of this study have potential to be generalized, with some restrictions, to social and healthcare settings in Nordic countries (Finland, Sweden, and Norway). The healthcare system is decentralized, predominantly tax based and publicly provided. Furthermore, the scope of practice and the division of healthcare personnel is rather similar in the Nordic areas [70]. LPNs are key participants of the nursing workforce in USA as well. The scope of practice and role of the LPNs needs more careful assessment in many states [15, 41]. Hence, the results of this study can possibly give valuable information for a better understanding of the essential role of the LPNs and the retention of the LPNs. In online surveys, the respondents are not selected through probability sampling, which has a negative effect of the generalizability of the results [64]. The results of this study are best applied among evidence-based practice of LPNs'. Furthermore, this study is replicable, which contributes to generalizability of the results [71].

7. Conclusions and Future Research

There is a gap in research concerning the attractiveness of the LPNs work and the wellbeing at work of an LPN. This study helped to bridge this gap by applying the instrument CFGW to examine LPNs' perceptions of the attractiveness of their work and wellbeing at work. The research revealed several factors which affect the attractiveness of the LPN role and wellbeing at work. Several independent variables showed significant associations with the dependent variables describing attractiveness of work and wellbeing. The participating LPNs shared that personal wellbeing is exceptionally important element regarding the attractiveness of work. LPNs' wellbeing was further supported by the quality of care and reconciliation of work and private life, for instance.

This research gives important information, especially for the leaders in nursing for a better understanding about the factors promoting the attractiveness of work and wellbeing of the LPNs. This information is vital regarding, for example, the retention of the LPNs. Actions aiming to develop the work-related environment requires collaboration with the healthcare personnel, including the LPNs. Participatory management is one of the key elements to be considered. Nurse managers play a crucial role in developing the work and wellbeing of the LPNs systematically and effectively. Current environment in evidence-based practice regarding the development of LPNs' work needs better characterization. To this end, the findings of this study suggest that statistical methods can be applied to quantitatively investigate the attractiveness of nursing and wellbeing of the LPNs. Furthermore, in this study, specific factors were identified in line with the core aim of this study, which was to define factors that affect LPNs' attractiveness of work and wellbeing at work. The results of this study give more insight into development of evidence-based practice in nursing and in the LPNs' work environment. In the future, it is

recommended to study the LPNs' attractiveness of work with qualitative methods to confirm the results.

Data Availability

The survey data of this study are not publicly available due to confidentiality reasons. In case of further inquiries regarding the availability of data, please contact the corresponding author.

Additional Points

What Is Already Known. (i) Shortages in the healthcare workforce represent a global threat that has particularly grave implications for elderly care services, as LPNs and RNs are the largest professional groups. (ii) There is a lack of data about a vital group of healthcare professionals, the LPNs. (iii) Although the discrepancy between the demand and supply of nurses is a global phenomenon, little research has focused on the factors which promote the attractiveness of the professional and wellbeing at work. *What This Paper Adds.* (i) This study has identified factors which affect the attractiveness of work and wellbeing at work from the LPNs' perspective. (ii) The attractiveness of work was defined based on six work-related areas, namely, well-functioning practices, participatory management, rewarding work, development of expertise, quality of care, and reconciliation of work and private life. Together, these form a structural basis for an LPN's wellbeing. (iii) Statistical methods were applied to assess wellbeing among LPNs, and the results can be used to improve wellbeing in practice in addressing nursing shortages.

Conflicts of Interest

The authors declare that they have no conflicts of interest. The author, Viinikainen S., works at the Union of Health and Social Care Professionals in Finland.

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Supplementary Materials

Supplementary file 1: confirmatory factor analysis (CFA) assessing the model fit. Supplementary file 2: average interitem correlation, corrected item-total correlation, split-half reliability adjusted using the Spearman-Brown prophecy formula, and composite reliability. (a) Average interitem correlation and corrected item-total correlation. (b) Split-half reliability adjusted using the Spearman-Brown

prophecy formula and composite reliability. (*Supplementary Materials*)

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Research Article

Lived Experiences of Intensive Care Professional Nurses Caring for COVID-19 Patients in Private Hospitals in Gauteng, South Africa: A Phenomenological Study

Welhemina Molala  and Charlene Downing 

Department of Nursing, University of Johannesburg, Johannesburg, South Africa

Correspondence should be addressed to Charlene Downing; charlened@uj.ac.za

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Aim. To explore and describe intensive care professional nurses' experiences caring for COVID-19 patients in private hospitals in Gauteng, South Africa. *Introduction.* Pandemics are unique forms of disasters characterised by adverse psychological symptoms and behaviours. Literature confirms a globally increased workload during pandemics, causing emotional exhaustion and poor concentration among healthcare workers. Moreover, high mortality rates are mentioned as a cause of moral distress and moral injury to healthcare workers. South Africa was unprepared for the COVID-19 pandemic, as evidenced by overcrowded hospitals, a lack of resources, and high mortality rates. *Materials and Methods.* A qualitative, phenomenological, exploratory, descriptive, and contextual research design was used. The five largest private hospitals from the same hospital group in Gauteng were chosen as they were admitting many COVID-19 patients. Fifteen participants were selected through purposeful sampling. Semistructured, in-depth, individual interviews were conducted and audio-recorded, and field notes were taken from April 2022 to December 2022. The interviews were transcribed verbatim and analysed using Giorgi's approach. *Results.* Three themes emerged: abrupt transition from normality to the COVID-19 pandemic; experienced isolation from family, community, and nursing management; and feelings of satisfaction and gratitude for teamwork and learning. *Conclusions.* It is essential for nurses' holistic care to be considered along with patients' holistic care. The findings in this study could drive healthcare institutions in South Africa to respond to nurses' health, care, and support needs. *Implication for Nursing Management.* Nursing management should consider shorter and fewer consecutive workdays for nurses to rest and restore their energy levels. Nurse management should also provide human caring by being visible to the nurses and communicating with them. Holistic self-care practices should be included in nurses' in-service training programmes.

1. Introduction

On 31 December 2019, the coronavirus disease 2019 (COVID-19) was reported to cause severe viral pneumonia in Wuhan, China [1]. The virus rapidly spread worldwide, resulting in a pandemic. COVID-19 is a complex respiratory disease that complicates acute respiratory distress syndrome (ARDS), and patients often require mechanical ventilation [2]. The transmission mode is human-to-human, and the virus is characterised by high transmission efficiency and the involvement of multiple organs [3].

South Africa's National Institute of Communicable Diseases (NICD) reported its first confirmed case on 5

March 2020 [4], and the president of South Africa declared a national disaster on 23 March 2020. The pandemic's rapid spread resulted in national lockdown restrictions on 27 March 2020. All citizens were forced to remain at home. Like other countries, healthcare workers in South Africa faced the unknown, highly contagious COVID-19 virus with inadequate resources and guidelines [5, 6]. An intensive care unit is mainly defined by highly trained nurses, doctors, and medical equipment that can assist in reversing organ dysfunction, such as mechanical ventilators and advanced physiological monitoring devices [7]. In South Africa, the training of the ICU nurse is regulated by R.212, and nurses must have the additional qualification "Medical Surgical:

Critical Care Nursing” from the South African Nursing Council (SANC) [8]; a critically ill patient requires the skills of critical thinking and clinical judgment underpinned by scientific, biomedical, and technological knowledge [9]. However, in this study, professional nurses were unexpectedly transferred from the wards to ICUs without knowledge and skills of critically ill patients’ care. Sufficient physical, emotional, and mental support is essential to promote nurses’ ability to care for patients [10]. Yet, healthcare workers were under enormous stress and were physically, emotionally, and mentally challenged during the pandemic.

Cotton and Iro [11] affirmed that the world was unprepared for this pandemic, as evidenced by overcrowded hospitals, high mortality rates, and staff shortages. Ulrich, Rushton, and Grady [12] agree that a general lack of institutional preparedness for the volume of COVID-19 patients within hospital systems left frontline nurses physically and emotionally susceptible to a persistent sense of guilt and anxiety. Al-Dossary, Alamri, and Albaqawi [13] also confirm that COVID-19 challenged nurses due to the novelty of the disease, and a lack of information and training accelerated the rate of hospital infections. The unavailability of guidelines was also significantly associated with anxiety among nurses [14] who faced an unexpected situation and had no experience and skill to deal with COVID-19 [15].

The World Health Organization [1] highlighted a global shortage of six million nursing positions, and combined with the staff shortages during the pandemic, quarantine also made nursing care difficult. In addition, many healthcare workers in South Africa were infected with COVID-19, placing more strain on the remaining healthcare workers [16]. Carter and Notter [17] confirm that COVID-19 placed unprecedented pressure on critical care services, stretching resources beyond capacity. Increasing the number of beds in intensive care units (ICUs) to accommodate critically ill COVID-19 patients resulted in a higher workload for nurses [18]. Moreover, increasing ICU beds resulted in a shortage of equipment such as ventilators and high-flow nasal machines, and nurses became part of the ethical decision-making process in this context, reflecting on criteria such as beneficence, non-maleficence, autonomy, and justice [19]. Eftekhar Ardebili et al. [20] indicated that participants reported a heavy workload, fast changes in the workplace, a loss of control over caregiving situations, feelings of helplessness, ineffectiveness in routine work, and the inadequacy of previous work experiences. Elhadi et al. [21] similarly indicated that a significant number of healthcare workers expressed low levels of awareness and preparedness regarding COVID-19, and their concern was that inadequate knowledge is a risk factor for disease transmission and can lead to low levels of care.

Mekonen et al. [14] pointed out that the unavailability of guidelines, fear of infecting family members, and having a chronic disease were significantly associated with nurses’ anxiety. Nursing managers also described their management approach during the pandemic as novel and complex, and nurses were losing trust in them [22]. This same view is supported by Sperling [23], who explains that nursing care is extraordinarily stressful and demanding due to rapid changes

in guidelines and regulations. Moreover, nurses’ fear and a lack of technical skills and knowledge about COVID-19 were significant coefficients in their mental health [24]. The inability to assist patients was also demotivating and frightening for nursing staff. Robertson, Maposa, Somaroo, and Johnson [25] claim that healthcare workers’ motivation and empathy are critical to effective and compassionate care. However, adverse mental health conditions were noted among healthcare workers exposed to COVID-19, and this affected their patient care. Witnessing unacceptable situations also causes individuals to react by blaming themselves, either for the choices they made or their inability to perform specific actions [26]. Moreover, inadequate knowledge in caring for patients with COVID-19 could result in moral injury, a form of psychological distress attributed to performing an action that contradicts one’s own moral and ethical code, resulting in guilt, shame, and anger [27]. South Africa does not have clinical resource organisations supporting nurses’ holistic care, such as the American Holistic Nurses Association, which encourages staff’s well-being.

During the pandemic, healthcare workers were left alone due to restrictions to control the spread of the virus and expected to deal with patients’ traumatic experiences and the unexpected loss of friends, family, and colleagues [28]. Said and El Shafel [29] also emphasise that inadequate emotional preparation among nurses dealing with death and dying is linked to occupational stressors. In addition, while working with COVID-19-positive patients, nurses wear heavy personal protective equipment (PPE) and often go six hours without using the bathroom, tolerating hunger and thirst. These working conditions affect the nurses’ physical, physiological, emotional, and psychological health [30], and the PPE is considered inadequate and not user-friendly [23].

The COVID-19 pandemic has consistently been documented as negatively affecting nurses worldwide since the outbreak’s start [31–33]. Several South African studies have explored nurses’ experiences caring for COVID-19 patients during the pandemic. However, these studies were conducted in contexts and healthcare institutions that differ from this study. Those studies were carried out in primary healthcare facilities [34–37], and other studies included all healthcare workers: nurses, medical doctors, and allied health professionals [38]. To fill this gap, this study explores the lived experiences of professional nurses caring for COVID-19 ICU patients in private hospitals in Gauteng, South Africa.

2. Materials and Methods

The authors followed a descriptive qualitative research method to explore professional nurses’ experiences caring for patients with COVID-19 in private hospitals in Gauteng, South Africa. The first author used the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines in approaching and reporting on this qualitative study.

2.1. Study Design. A qualitative, exploratory, descriptive, and contextual research design was used in this study. In particular, we employed a phenomenological approach to

inquiry, focusing on understanding individuals' lived experiences and the meaning they attribute to those experiences. Phenomenology aims to provide a rich description of human experiences as they are perceived and understood by individuals [39]. Through in-depth, individual interviews, we aimed to understand participants' lived experiences and the meaning they ascribed to them. This approach offers a detailed exploration of participants' perspectives within their natural contexts. Data analysis involves reducing and organising data and extrapolating meaning [40, 41]. It is also defined as a dynamic process of weaving together emerging themes and identifying key ideas or units of meaning and material acquired from the literature [42]. Giorgi's analysis method was used to uncover the meaning of the phenomenon as experienced by individuals through the identification of essential themes [43] (see Table 1).

2.1.1. Settings. Data were collected at five private hospitals from the same private healthcare group. These private hospitals were chosen because they are the largest private hospitals in Gauteng and were admitting many COVID-19 patients during the pandemic because of their bed capacity. The distance between each hospital was eight to ten kilometres. The interview venue in each hospital was unique; boardrooms, clinical department offices, the night manager's office, and the infection control office were used for interviews. All five hospitals accommodated the first author in a way that ensured participants' privacy was protected and no disturbances occurred during interviews. Moreover, COVID-19 protocols were strictly followed during interviews, including wearing face masks and adhering to social distancing, and hand sanitisers were available in each interview room.

2.1.2. Participants, Sample, and Sampling. In this study, the population was all professional nurses caring for COVID-19 patients in a private hospital in Gauteng. In this study, the researcher (first author) used purposive sampling. Grove and Gray [40] define purposive sampling as recruiting participants based on their knowledge, experience, or views related to the intended study. This study's purposive, convenient sample was professional nurses caring for ICU COVID-19 patients in five private hospitals of the same hospital group in Gauteng ($N = 15$).

Inclusion criteria are the characteristics the participants must possess to be part of the target population [45]. This study's inclusion criteria were as follows: (a) all professional nurses in the chosen private hospitals caring for patients in COVID-19 ICUs during the pandemic; (b) the professional nurses had to be permanently employed at one of the five private hospitals, working day or night shifts in the COVID-19 ICUs; (c) participants had to be able to read and speak English; and (d) professional nurses who are working in the COVID-19 ICUs. Exclusion criteria are characteristics that restrict the population to a homogenous group of subjects [46]. This study's exclusion criteria were as follows: (a) professional nurses who did not work in the COVID-19 ICUs full time or those working as agency staff as they were often unavailable; (b) enrolled and auxiliary nurses working

in the COVID-19 ICUs and general units, as they work under the direct supervision of professional nurses, and they were not assigned to nurse critically ill patients; and (c) professional nurses working in the general COVID-19 wards.

The first researcher, who is a deputy nurse manager, conducted personal recruitment; the researcher got expertise to conduct a phenomenological study. The researcher met with the hospital management of all five hospitals separately to explain the intended study in detail. All five hospitals were happy to be chosen for the proposed study, and they all agreed that the interviews could be conducted during shifts. The deputy nurse managers of each hospital were chosen as gatekeepers, as they are the most involved with staff; this view is supported by Aaltonen and Kivijärvi [47], who agree gatekeepers are professionals or individuals engaged in everyday practice.

The gatekeepers play a key role in ensuring researchers gain access to potential participants and sites for research [48]. The researcher left information letters with the gatekeepers in each hospital to be distributed to all professional nurses who worked in COVID-19 units during the pandemic. Fifteen participants contacted the researcher voluntarily to indicate their willingness to participate in the study [44]. The researcher contacted the gatekeepers to arrange a suitable venue after the participants agreed upon an interview date and time. The researcher was aware of possible coercion due to her position of power, but participation was entirely voluntary. Participants were also not compensated for their participation.

The sample consisted of five male and ten female participants who voluntarily agreed to participate. Informed written consent was obtained from each participant. Participants' ages ranged from 27 to 45; the mean age was 27. All the participants were professional nurses, and three had post-basic diplomas in medical, surgical, and critical care nursing [9]. Their nursing experience ranged from one to ten years. Participants' demographic information is summarised in Table 2.

2.2. Data Collection. This study explored the experiences of professional nurses working in COVID-19 units in Gauteng, South Africa, from the beginning of the first wave until the end of the fifth wave. However, data were only collected from the end of the fourth wave (April 2022) to the fifth wave (December 2022). All the participants had been working in COVID-19 units since the pandemic's outbreak in the country. The first author thoroughly explained the purpose of the study to participants before obtaining their informed consent. The interviews were conducted between 10h00 and 11h00 with the permission of the nursing service managers after the doctors' rounds and participants' morning routine to avoid disruptions to care. The gatekeepers also arranged for clinical facilitators to help, if needed, during the participants' interviews.

The researcher conducted semistructured individual interviews that lasted 45 to 60 minutes, using various communication skills to gather rich information, and recorded information using an audio recorder, observation skills, and field notes. The researcher gained experience in

TABLE 1: Themes, subthemes, and quotes from participants [44].

Subthemes	Categories	Quotations
<i>Theme 1: abrupt transition from normality to the COVID-19 pandemic</i>	Rapid changes in working structure, COVID-19 policies, and more responsibilities	Participant 7: "We felt that management was failing us, changing protocols many times but not coming to us to hear our problems"
	Participants were overworked due to a shortage of staff	Participant 2: "We were not prepared; we did not know the signs and symptoms of it and how it spread from one person to another. We were all scared, and we were overworked"
(1.1) Participants felt overwhelmed, overworked, physically and mentally exhausted, and faced high mortality rates	Participants faced moral distress and moral injury	Participant 8: "... shortage of staff affected us negatively. Patients were left with us; no visitors were allowed. Most of the staff members were infected. Nursing three patients and sometimes you find us that you are the only one who is ICU trained. Most of the staff never nurse a ventilated patient" Participant 1 shared his sadness: "We worked ten days or more straight shift to cover the ward"
	Participants witnessed an increased death rate	Participant 4: "We are still not recovered emotionally from seeing lots of people dying. We have lost so many patients"
	The extra burden of patient care led to self-neglect, and nurses sacrificed their own holistic needs	Participant 2: "We were in the ward for 6 hrs. In that six hour we couldn't eat, or drink anything. We were sweating to the point that we were thirsty. We kept on working because our patients were very sick"
<i>Theme 2: experienced isolation from family, community, and nursing management</i>	Participants sacrificed seeing their families and friends and suffered loneliness	Participant 3: "You arrived at home after a hectic day, you are tired physically and emotionally, you can't share with your family because you are scared that you might infect them, you isolate yourself"
(2.1) Participants experienced stigma from the community and isolation from family	Participants experienced stigma from the community	Participant 5: "... when I am off. I will stay in my flat because people in our building were assuming that if you are a nurse, you got Covid. You can see the way they were looking at me and suddenly avoiding me"
(2.2) Participants mentioned a lack of support from nursing management	Participants shared that nursing management did not physically or emotionally support them during extremely challenging times	Participant 4: "Nursing management was not even coming inside just to say thank you. Only people from outside on TVs and radios that were acknowledging our hard working, it is very sad"
<i>Theme 3: feelings of satisfaction and gratitude for teamwork and learning</i>	Participants experienced very positive team support	Participant 7: "Jaa, we were good team there were some instances when we talk about the incidents that happened and how to improve ourselves. Yes, and after talking we were feeling better. We were praying every morning before starting the routine and it was helping"
(3.1) Participants expressed that COVID-19 gave them learning opportunities and empowered them to mature professionally	Participants shared their joy when patients recovered	Participant 1: "I have learned a lot. After so much that I have learned, I want to do a degree in Nursing. Nursing COVID-19 patients has encouraged me to study more. I have realized that I need more knowledge"
(3.2) Participants expressed feelings of satisfaction	Participants shared their joy when patients recovered	Participant 4: "It was hectic, but we were grateful if we extubate a patient and see them recovering well, it was very pleasing. Discharging patient home was a bonus, we will be so excited. Patients will phone us and update them about their progress, we were also doing the follow up, they were concerned about us. They were so grateful"

TABLE 2: Summary of participants' demographic information [44].

Participant	Gender	Age	Qualification	Post-basic qualification	Years of experience as a professional nurse	Department working prior to COVID-19
1	Male	27	Professional nurse		1	Surgical ward
2	Female	29	Professional nurse		1	Medical ward
3	Male	41	Professional nurse		4	Orthopaedic ward
4	Female	33	Professional nurse		10	Oncology
5	Female	29	Professional nurse		2	Surgical
6	Female	45	Professional nurse		4	High care unit
7	Female	31	Professional nurse	“Diploma in Medical Surgical: Critical Care Nursing” (SANC, 1993: R.212), March 2017	6	Intensive care unit
8	Female	38	Professional nurse		3	Surgical ward
9	Female	29	Professional nurse		3	Medical ward
10	Male	45	Professional nurse	“Diploma in Medical Surgical: Critical Care Nursing” (SANC, 1993: R.212), March 2017	10	Intensive care unit
11	Female	32	Professional nurse		3	Orthopaedic ward
12	Male	41	Professional nurse		1	High care unit
13	Male	28	Professional nurse		3	Surgical ward
14	Female	45	Professional nurse		6	Medical ward
15	Female	31	Professional nurse	“Diploma in Medical Surgical: Critical Care Nursing” (SANC, 1993: R.212), March 2017	8	Intensive care unit

qualitative research during her master's degree study, and she gained expertise in phenomenological studies. The first interview was conducted in the presence of the second researcher, who has extensive research knowledge in qualitative research, a professor in nursing science. This interview was regarded as a pilot interview to determine the central question's effectiveness in gathering the required information based on the study's objective. The central open-ended question was as follows: "How is it for you to care for COVID-19-positive patients?" The pilot interview was successful, provided rich data, and was added as part of the data analysed for the main study. Each interview was transcribed verbatim on the day it was conducted and sent to the research supervisor for review. Data saturation was attained with the 15th interview, and the independent coder confirmed this saturation.

2.3. Data Analysis. Data analysis involves reducing and organising data and extrapolating meaning [49, 50]. To obtain a sense of the whole, the analysis starts by reading and rereading the data, looking at themes, emotions, and the unexpected, considering the overall picture [35]. Data were analysed for meaning using Giorgi's [43] approach, which involved the following steps: (a) the first author read the complete transcripts to get a sense of the whole and bracketed her preconceived knowledge and ideas regarding the phenomenon under study to focus on professional nurses' perspectives. The information was obtained and transcribed from in-depth individual interviews, audio recordings, and field notes. (b) The first author went back to the beginning of the transcriptions and reread them. This time, every time she experienced a transition in meaning within the participant's attitude, she made a mark on the transcription. These parts are called "meaning units." (c) The authors transformed the data—still in the subject's words—into expressions that were more direct impressions of what the participant said. (d) The direct and psychologically more sensitive expressions were then reviewed, and with the help of free imaginative variation, an essential structure of the experience was formed. (e) The essential structure was then used to help clarify and interpret the raw data of the research.

The first author compiled, reanalysed, and interpreted the results. Data were manually coded using coloured pens to categorise the findings, identify significant patterns in all the interviews, and finally draw meaning. A discussion was held with the second author, and agreement was reached regarding the themes and subthemes that emerged, as differences only related to terminology and the phrasing of sentences. In May 2023, the first author also telephonically contacted the participants to confirm whether the data analysis was a true reflection of their meaning. None of the participants requested changes to the themes/subthemes.

2.4. Trustworthiness. Trustworthiness measures refer to the concepts adapted and promoted by Lincoln and Guba [51] to the essential framework for evaluating trustworthiness in qualitative research. Denzin and Lincoln [52] discuss the

trustworthiness criteria: 1. credibility: (a) prolonged engagement was adhered to as data collection started on 23 April 2022 and was completed on 14 December 2022. (b) Triangulation occurred by the first author using multiple sources of data collection, including in-depth, individual interviews, observations, and field notes. (c) Peer debriefing with the research supervisor, a professor in nursing science with extensive knowledge in qualitative research studies, also ensued. The supervisor reviewed and challenged the analysis to promote the rigour and credibility of the data analysis. (d) Member checking: collected data were verified with the participants, who confirmed that the findings reflected their feelings and experiences. 2. Transferability: (a) purposive sampling was used, and a description of the participants' demographic profile and the setting was provided. (b) The research methodology was described in detail. 3. Dependability was heightened in the discussion of the results. 4. Confirmability: adequate and relevant references were used, and there are retrievable, well-organised collected data.

In addition, the first author wrote reflexive notes, indicating a lot of introspection and internal examination to explore her feelings, experiences, and biases, which were bracketed to enhance objectivity. As defined by Polit and Beck [53], bracketing is a method some qualitative researchers used to reduce potential taints caused by preconceptions. This study reminded the researcher of her experiences of being infected with COVID-19, and she found it challenging not to discuss these experiences with participants but to pause, take a drink of water, and refocus on the participant.

2.5. Ethical Approval Details. The study was approved by the Faculty of Health Sciences of the University of Johannesburg's Higher Degrees Committee (HDC-01-96-2021), the Faculty of Health Sciences Ethics Committee (REC-1252-2021), and the research committee of a private hospital group where the participants were employed (UNIV-2021-0054).

3. Results

The sample consisted of five male and ten female professional nurses aged 27 to 45; the mean age was 27. Three main themes emerged, and these were further subdivided into subthemes. The narrative that follows describes the qualitative themes and offers quotations demonstrating how professional nurses' physical, mental, emotional, and social health was affected during the pandemic.

3.1. Theme 1: Abrupt Transition from Normality to the COVID-19 Pandemic. Participants described the COVID-19 as overwhelmed, overworked, physically and mentally exhausted, and faced high mortality rates, leaving them feeling overwhelmed and overworked. Professional nurses' unexpected transfers from general wards to ICUs to care for very sick patients also created significant frustration for ICU professional nurses. They had to teach their colleagues from the general wards how to nurse very sick patients on ventilators. Moreover, professional nurses from the general wards were frustrated because they had to learn fast.

3.1.1. Subtheme 1.1: Participants Felt Overwhelmed, Overworked, Physically and Mentally Exhausted, and Faced High Mortality Rates. The participants also mentioned that there was enormous pressure on them as they did not know about COVID-19. Participants feared possible errors and were held accountable even though they were not the primary nurses because professional nurses with a lack of ICU experience from the general wards were working under their direct supervision. In normal situations, the shift leader supervises and supports the team to ensure safe patient care. The shift leader is thus held accountable for the team and their actions. Participant 5 shared: "Nurses from the ward didn't know how to nurse very sick patients on the high flow machines, Continuous positive airway pressure (CPAP) machines and ventilators. We had to teach them quickly the basic things like trouble shooting when ventilator alarms and the most important things, not to ignore the alarms. The patients were very sick, more pressure on us. They were working under direct supervision of us; we were responsible and accountable for their patients and our patients." During the pandemic, no one was assigned to shift leading, and ICU staff already taking care of more than three critically ill patients at a time were simultaneously responsible for staff from the general ward assigned next to them.

The shortage of nurses resulted in prolonged shifts and increased professional nurses' duties. Extended shifts led to extreme physical and mental exhaustion. Participant 8 said: "shortage of staff affected us negatively. Most of the staff members were infected. Nursing three patients and sometimes you find us that you are the only one who is ICU trained, accountability is on your shoulders." Participant 1 shared his sadness: "We worked ten days or more straights shift to cover the units. There was a time where I had to look after four High care patients alone due to shortage of staff." Participant 11 mentioned a similar experience: "Yes it was hell. We planned that we would eat before going in and use the bathroom as we know that we will wait for 6 hours to drink, eat or use the bathroom. Going out and leaving your patients with your colleague who is already battling with more than 5 patients was not easy. We opted to go and eat quickly and come back, not to spend an hour break."

Participants were unhappy with the rapid changes in the COVID-19 policies. "We felt that management was failing us, changing protocols many times but not coming to us to hear our problems" (Participant 7). Participant 4 mentioned the same challenge: "Management were changing protocols daily or twice a day, sometimes we were not getting those communications only after work when you switch on your phones you will get lots of forwarded messages from our unit manager, received from the management."

Participants witnessed many deaths and suffered moral distress, which resulted in moral injury. Participant 3 reportedly experienced significant distress as a result of the multiple deaths they faced during the pandemic: "second wave was bad in that most people were dying, arriving at home, you just have to bath and sleep. When you are sleeping, your mind is still going through all what happened during the day, you cannot sleep. Most of us were depressed due to lots of

death." Participant 9 said: "You hear your colleague crying after being called to the phone, just to tell her that somebody in their family died. She will cry and go out for 30 minutes and come back to look after her patients. It was a norm that you will attend the funeral to only your immediate family, not the uncles or cousins. It was bad. I am from extended family; we are too close to uncles and cousins, but we couldn't bury them."

Participants also indicated that the extra burden of patient care led to self-neglect, and they had to sacrifice their own holistic needs. Participants put the patients first and neglected their basic needs; they had to wear protective gear for up to six hours at a time due to the shortage of PPE and staff. Consequently, participants were facing dehydration and discomfort. Participant 2 explained: "we were in the ward for 6 hrs. In that six hours we could not eat, or drink anything. We were sweating to the point that we were thirsty. We kept on working because our patients were very sick."

3.2. Theme 2: Experienced Isolation from Family, Community, and Nursing Management

3.2.1. Subtheme 2.1: Participants Experienced Stigma from the Community and Isolation from Family. The participants indicated that their relationships with friends, families, and the community changed during the pandemic. Some community members labelled them as having COVID-19. The participants said they were isolated and often avoided. Participant 5 shared: "...when I am off, I will stay in my flat because people in our building were assuming that if you are a nurse, you got Covid. You can see the way they were looking at me and suddenly avoiding me." A similar perception of social isolation was shared by Participant 2: "I have lost my cousin, my uncle's son. I couldn't go and bury him. After a week, his wife died as well, and I couldn't go and bury her. We were so close; we were like twins. Same age as me. So, my uncle is angry with me, he even told my parents that I must not come to his house. I am from the rural area, people there will never understand."

3.2.2. Subtheme 2.2: Participants Experienced Isolation and a Lack of Support from Nursing Management. Most participants felt management should have done more to provide sufficient PPE to protect the staff. They also concurred that the information should have been more consistent and clearer. The participants mentioned that news of the deaths of colleagues caused them tremendous psychological harm, and management did not comfort them. This increased their fear that they were facing the danger alone, and they worried that it might happen to them. Many participants ultimately mentioned a lack of support from management during the interviews. Participant 4 said: "There was a shortage of PPE as the hospital was getting full. Zapping of gowns and N95. We were not even sure if they are 100% safe. We felt the hospital is gambling with our lives, moreover they were not even coming inside just to say thank you. Only people from outside on TVs and radios that were acknowledging our hard working. It is very sad."

3.3. Theme 3: Feelings of Satisfaction and Gratitude for Teamwork and Learning

3.3.1. Subtheme 3.1: Participants Expressed That COVID-19 Gave Them Learning Opportunities and Empowered Them to Mature Professionally. The regular ICU staff described being grateful for the support they received from colleagues from other departments. Similarly, nurses who were transferred to the ICU shared their gratitude for the support from the ICU nurses. Participants mentioned that their resilience was enhanced by shouldering the COVID-19 burden with their colleagues. Participant 5 explained: “. . . it was not easy, but we were a good team of nurses and doctors. We supported one another. We told ourselves that we need to be there for our patient.”

3.3.2. Subtheme 3.2: Participants Expressed Feelings of Satisfaction. The participants expressed their pleasure at seeing patients recover and return home; it was a moment of joy for them. This was often described as a victory over the disease and gave the professional nurses hope for other patients and the strength to continue their work. Additionally, the participating nurses described many emotional moments, for example, when patients could communicate with their relatives for the first time in weeks. Participant 10 reflected: “It was hectic, but we were grateful if we extubate a patient and see them recovering well, it was very pleasing. Discharging patient home was a bonus, we will be so excited. Patients will phone us and update them about their progress, we were also doing the follow up, they were concerned about us. They were so grateful.”

Themes, subthemes, and participants’ quotes are summarised in Table 1.

4. Discussion

The results of this study revealed that professional nurses experienced posttraumatic stress due to multiple stressors such as a shortage of staff, inadequate knowledge of COVID-19, high mortality rate, isolation from family, and stigma from the community. Moreover, a lack of support from nursing management was emphasised. The participants shared their negative experiences linked to physical and mental exhaustion, sleepless nights, fear, depression, and a lack of holistic self-care practices. Although the nurses mentioned some negative experiences, they expressed satisfaction and gratitude for their team’s efforts (Table 1, [48]).

Professional nurses described the COVID-19 pandemic as an abrupt transition from normality to the COVID-19 pandemic. It was an unexpected chaotic disruption in the care of patients due to the overflowing of patients in the hospitals despite a gross shortage of staff. Moreover, most of these COVID-19 patients were critically ill in the ICUs. This resulted in rapid changes in working structure and more responsibilities as the professional nurses with a lack of knowledge and skills in nursing a critically ill patient were moved from the wards to the ICUs. The South African Nursing Council Competencies for Critical Care Nurses’ Nursing Act (Act No. 33 of 2005) [9] suggests that patient care in ICUs should be comprehensive

critical care. Nursing practice in South Africa is governed by the R767 regulations, which outline the acts and omissions for which the SANC can take disciplinary action (Nursing Act No. 33 of 2005) [54], such as failing to maintain a patient’s health status. The nurse-to-patient ratio in the ICUs is 1 : 1; however, in this study, the professional nurses mentioned that they were nursing three critically ill patients. Participants shared that they worked ten days or more straight shifts to cover the unit, which is against the South Africa Basic Conditions of Employment Act [55], which states that an employer may not require or permit an employee to work more than 45 hours in any week.

Professional nurses mentioned that they were overwhelmed, overworked, and physically and mentally exhausted. Similar findings were mentioned by Yunitri, Chu, Kang, Jen, Pien, Tsai, Kamil, and Chou [56] that hospitals and clinics overcrowded with COVID-19 patients left health professionals with no time for rest, impacting their psychological well-being. This is asserted by Liu et al. [57] that intensive work during the COVID-19 pandemic drained healthcare providers physically and emotionally. Alquwez [58] mentioned that as nurses deal with a terrible pandemic and exhausting work experiences, well-being at work is critical and needs to be emphasised. Inocian, Cruz, Saeed Alshehry, Alshamlani, Ignacio, and Tumala [59] also mentioned that nurses’ work experiences and work conditions during this pandemic adversely affected their professional quality of life. Although the South African Nursing Council’s (SANC) Nurses Rights [60] states that nurses have the right to a safe working environment that is compatible with efficient patient care and is equipped with at least the minimum physical, material, and personnel requirements; however, the working environment was not physically and mentally safe for the participants in this study.

During the interviews, professional nurses expressed frustration and stress regarding the frequent changes in COVID-19 protocols and policies. Catania et al. [61] wrote that the main challenges their participants raised were the constant change in care management guidelines and treatment protocols, which resulted in nurses providing care in uncertain conditions. LoGiudice and Bartos [62] also shared that the nurses in their study expressed that their stress was heightened because their hospital’s protocols changed daily. There was a lot of confusion from the administration with changing guidelines, directions, and endless questions. Persistent changes in protocols and policies were also mentioned by Firozskouhi et al. [63], stating that despite nurses’ crucial role in public health in critical situations such as pandemics, they face certain obstacles in managing events when there are no predefined guidelines or protocols. Irrespective of the frustrations and confusions due to unclear, inconsistent guidelines, professional nurses are obliged to adhere to the South African Nursing Council’s (SANC) Code of Ethics [64], which states that nurses are required to demonstrate the art of nurturing by both applying professional competencies and positive emotions.

Professional nurses faced moral distress and moral injury due to high mortality rate. The participants expressed that they were mentally affected due to the high mortality rate, and some could not sleep as a result. Their distress was also related to patients dying alone due to the visitor restrictions that were imposed during the pandemic. Lake et al. [65] reported that the most distressing situations for professional nurses included caring for patients dying without family present. Robinson and Stinson [65] similarly concurred that their participants were stressed at seeing patients dying without their loved ones by their side. Patients with COVID-19 faced lonely deaths, and family members were not allowed to be present with their loved ones [66]. Castaldo Lusignani Papini Eleuteri and Matarese [67] stated that nurses consequently suffered emotionally and felt inadequate to respond to the needs of many dying patients during the COVID-19 pandemic. Several studies concluded that posttraumatic stress disorder is a major concern in health institutions [68]. Spilg et al. [69] concurred that healthcare workers caring for COVID-19 patients showed signs of severe moral distress, anxiety, and depression. Hossain and Clatty [70] stated that the stress nurses face would create moral distress and have a lasting impact; this is why the term “moral injury” is most suited in the context of COVID-19. This view is supported by Al Maqbali [71], who claims nurses experienced sleep disturbance related to increases in stress, anxiety, depression, high workloads, fear, pressure, and helplessness during the pandemic; to care responsibly for patients, especially as they practice in settings with more complex needs, nurses need to feel healthy, well, and supported. In this study, the participants were not offered any form of psychoemotional support.

Participants also indicated that the extra burden of patient care led to self-neglect, and they had to sacrifice their holistic needs. Participants’ needs were compromised, and they shared that they kept working in unfavourable conditions without eating or drinking for extended periods. During the interviews, the professional nurses shared that they were wearing their PPE for up to six hours before they could go out for a break, leading to sweating and itching. The South African Government’s Batho Pele Principles, 1977 [72], “putting other people first,” and the South African Nursing Council’s (SANC) Pledge of Service [73] were applied by professional nurses during the COVID-19 pandemic, putting patients first and neglecting their basic needs. Abiakam, Worsley, Jayabal, Mitchell, Jones, Fletcher, Spratt, and Bader [74] indicated that wearing PPE for more than four consecutive hours led to redness of the cheeks, dry mouth, redness of the nose bridge, and redness of the ears due to N95 masks, dryness of the mouth when wearing surgical masks, skin dryness, sweating, and redness from wearing gloves, headaches from wearing goggles/face shields, and sweating when wearing overalls or a gown. Harris, McLeod, and Titler [75] similarly stated that the lack of breaks, including meal and bathroom breaks, affected their participants’ physical health. Wearing PPE for a long time exposed nurses to physical health complications such as pressure injuries, dermatitis, dehydration, and headaches [76, 77].

Every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees, according to Occupational Health and Safety Act 85 of 1993 [78].

Professional nurses experienced social isolation from their family and friends. Professional nurses shared that they had a fear of transmitting the virus to them and decided to isolate themselves to protect families and friends. However, it was negatively affecting their mental well-being. Many nurses felt social rejection, the closeness of the relationship, a sense of social rejection, and a high level of loneliness and depression [79]. Many nurses had quarantined themselves from their families and others to prevent the risk of transmission, which had exacerbated their feelings of anxiety, stress, and social isolation [80]. Çelik et al. [81] also revealed that nurses felt pain because the pandemic process had separated them from their families and children.

Isolation from the community affected the professional nurses’ mental well-being negatively. Some professional nurses indicated that their relationships with friends, families, and community changed during the pandemic. Much of this was related to the fear of transmitting the virus to them, and some community members were labelling them as having COVID-19. Nurses who cared for patients diagnosed with COVID-19 experienced stigma and were labelled “COVID nurses” [82]. Asa et al. [83] shared that nurses were distressed due to stigma and discrimination against nursing COVID-19 patients. Ramaci et al. [84] also indicated that during the COVID-19 pandemic, healthcare workers were facing stigma, resulting in psychological distress. In South Africa, a nurturing of humanism called “Ubuntu,” meaning a human being is a human being through the otherness of other human beings, is supported throughout the country. However, this study revealed that the community did not support nurses during the pandemic.

Moreover, most participants mentioned a lack of support from nursing management and their invisibility during these extremely challenging times. Participants expressed that they were facing the danger of the new virus alone, and nursing management was not visible. Dawood, Tomita, and Ramlall [85] highlighted high levels of depression, anxiety, and stress, combined with poor perceptions of employer support, illustrating the need to identify and address this population’s psychosocial support needs. During pandemics, healthcare organisations should maintain clear, fluid, and regular communication with nursing staff, which could help increase staff members’ confidence and sense of control [86]. It was also confirmed by Joo and Liu [87] that nurses did not receive adequate support from hospitals and the healthcare system and lacked the necessary protective equipment, such as masks and hand sanitiser, to ensure the safety of healthcare workers. AL-Abrow et al. [88] suggested that there is an excellent need for managerial interventions, for example, support, appreciation, and recognition, to help healthcare workers feel valued in their work. Inadequate leadership support was also attributed to a lack of support for the healthcare team, including inadequate staffing and

supplies [89]. Managers should thus respond appropriately to decrease nurses' COVID-19-related phobias by educating, counselling, or providing psychotherapy and work-life balance strategies.

Participants expressed the feelings of satisfaction and gratitude for teamwork and learning. This view is consistent with other studies, reflecting that healthcare workers' ability to support their colleagues creates a growth environment [90]. Veitch and Richardson [91] pointed out that coworker support benefits nurses' mental well-being during times of crisis. Nurses often put the team's needs before their own and hold a cultural ideal of team loyalty; they often work even when sick so they do not let the team down [92].

Participants mentioned that COVID-19 empowered them to mature professionally. In this study, professional nurses demonstrated resiliency and professionalism. Participants verbalised that they had grown professionally and learned a lot; this finding is consistent with Molala and Downing's [93] findings that their participants were eager to learn and achieve professional growth despite the challenges of working in a new environment. Although the provision of care led to physical and psychological distress among nurses, based on their commitment and professional obligations, this new experience also led to personal satisfaction [94]. Clinical nurses gained significant experience during the pandemic, positively affecting their readiness for future pandemics [95]. Alcalá-Albert et al. [96] also shared that their participants mentioned that clinical practice provided them with additional caregiving knowledge and techniques that were previously unknown to them. LoGiudice and Bartos [67] concurred that their participants experienced professional growth during the COVID-19 pandemic and felt they could deal with difficult situations.

When patients survived and were discharged, feelings of satisfaction felt like an achievement for professional nurses. Additionally, the participating nurses described many emotional moments, such as when patients could communicate with their relatives for the first time in weeks. Positive feelings when patients recover are embedded in Watson's theory as one of the Caritas, humanistic-altruistic value systems. Positive experiences were also mentioned by Taheri-Ezbarami et al. [97], who determined that caring for patients with COVID-19 satisfied nurses' needs, such as altruism and love for others, and it ultimately led to the formation of a sense of satisfaction in providing care.

5. Conclusions

This study revealed that psychosocial, mental, and physical care are paramount to professional nurses' ability to deliver holistic care to themselves and their patients. The authors hope this study's findings will help healthcare organisations develop new strategies and policies to support and prepare nurses for future pandemics and outbreaks. Moreover, professional nurses' holistic self-care should ultimately be

facilitated in nursing. Unfortunately, South Africa does not have clinical resource organisations that support nurses' holistic care, such as the American Holistic Nurses Association, which supports the well-being of nurses. The authors hope the nurses' voices will be heard, and awareness of the need to promote their mental health will be created. This information could drive healthcare institutions to plan for future pandemics and respond to nurses' health, care, and support needs [98].

6. Implication of the Study

To make nurses feel valued in their jobs, nursing management must provide support, appreciation, and recognition. It is recommended that nursing management consider shorter and fewer consecutive workdays for nurses so they can rest and restore their energy levels. Nursing management should provide human caring by being visible to the nurses and communicating with them continuously. Holistic self-care should be included in nurses' in-service training programmes. It is also essential that health institutions offer well-being and mental health support to their employees.

7. Recommendations for Future Research

Using the findings of this study, a quantitative study could be conducted to generate a questionnaire and distribute it to public and private hospitals; these findings could emphasise the need to support nurses' well-being. The study concurred on the need for a model to facilitate nurses' holistic care; this can lead to improved patient care and quality of life for nurses.

8. Study Limitations

Fifteen nurses were recruited from five private hospitals but none from state hospitals for this study. Therefore, the findings cannot be generalised to other populations. The study was conducted from the end of the fourth wave to the end of the fifth wave of the pandemic; if it had been conducted during the first wave, more experiences might have been shared as they happened. The first author is a deputy nurse manager, and although the study was not conducted in the hospital where she works, it is the same hospital group; thus, participants might not have felt comfortable sharing some of their experiences. Nursing categories such as enrolled and auxiliary nurses were excluded, limiting the overview of nurses' experiences during COVID-19.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Managing Shifting Visitor Restrictions in Hospitals during the COVID-19 Pandemic from National Authority Level to Charge Nurses' Practice: A Descriptive Study

Anne Sophie Ågård ^{1,2,3} Hanne Mainz ^{4,5} Tina Wang Vedelø ^{2,6}
Gitte Susanne Rasmussen ^{3,7} and Merete Gregersen ⁸

¹Department of Intensive Care, Aarhus University Hospital, Aarhus, Denmark

²Department of Public Health, Research Unit for Nursing and Healthcare, Aarhus University, Aarhus, Denmark

³Research Centre for Patient Involvement, Aarhus University and Central Denmark Region, Aarhus, Denmark

⁴Research Centre of Emergency Medicine, Aarhus University Hospital, Aarhus, Denmark

⁵Clinical Nursing Research Unit, Aalborg University Hospital, Aalborg, Denmark

⁶Department of Neurosurgery, Aarhus University Hospital, Aarhus, Denmark

⁷Department of Dermatology and Venereology, Aarhus University Hospital, Aarhus, Denmark

⁸Department of Geriatrics, Aarhus University Hospital, Aarhus, Denmark

Correspondence should be addressed to Anne Sophie Ågård; anneag@rm.dk

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Introduction. Little is known about how shifting hospital visitor restrictions issued by national health authorities were communicated, managed, and adapted by hospital charge nurses during the COVID-19 pandemic. **Aims.** To describe the shifting visitor restrictions and the passing on of restrictions from the national authority level to charge nurses and secondly describe charge nurses' management of the restrictions and their challenges when enforcing them. **Methods.** The study consisted of a document analysis and a cross-sectional survey including open-ended questions. Descriptive statistics and qualitative content analysis were used. The survey was distributed online to 88 charge nurses in somatic units in a Danish university hospital from March 2020 to April 2021. **Results.** Restrictions were communicated from national authority level in an effective administrative cascade. The charge nurses led their enforcement in each unit. In total, 71 charge nurses (81%) responded to the survey. For 70%, the wording of the restrictions was clear, while 31% found them challenging to handle. On a weekly or daily basis, 68% of the charge nurses deviated from the restrictions. They identified both upsides and downsides to the absence of relatives. Communication, collaboration, and leadership were experienced as key tools in the ongoing processes of adapting to shifting restrictions. **Conclusion.** During this severe health crisis, essential information was passed on through well-defined management levels in an effective communication pathway. Charge nurses and their professional values were challenged when balancing shifting national restrictions against individual needs of patients and relatives. **Implications for Nursing Management.** Charge nurses serve as vital intermediaries between national authorities and frontline nursing practice in managing shifting visitor restrictions during a pandemic. Their experiences can contribute to further qualifying nurse managers' considerations when designing family-centred hospital visitor policies for the future. Also, they may strengthen the handling of future sudden major organizational changes.

1. Background

In hospitals around the world, the Coronavirus Disease 2019 (COVID-19) pandemic caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has led to visitor restrictions to prevent the spread of the virus. Internationally, healthcare organizations have implemented policies and guidelines to restrict visitors' access to hospitals.

Hospital visitor restrictions have been a source of suffering and distress for all parties involved [1–6]. The absence of relatives is one of the most commonly identified factors that increase inpatients' anxiety when hospitalised with COVID-19 [3]. Furthermore, feelings of social isolation from close relatives and a lack of psychosocial support have been reported among COVID-19 inpatients [7]. For family members of both COVID-19 patients and other hospitalised patients, worry, anxiety, and uncertainty are common, and they have reported an increased need for information from care providers during the pandemic [8]. Relatives play an important role for individuals suffering from acute or chronic illness for shorter or longer periods of time, and the informal caregiving provided by relatives has been described as the backbone of care provision [9]. In addition to offering their affection and support, relatives sometimes take on more demanding tasks or responsibilities related to the nursing care, treatment, or rehabilitation of their loved one [10, 11], highlighting relatives' roles as important partners in many areas of patient care.

Prior to the pandemic, Danish hospitals generally had liberal visiting policies, acknowledging the ties between patients and their relatives and the important supportive role of relatives during hospitalisation and beyond. Consequently, in 2018, the board of directors at the 850-bed Aarhus University Hospital, where the present study was conducted, announced the end of fixed visiting hours. Therefore, when visitor restrictions were imposed upon all Danish hospitals in March 2020, this represented a historic break with a strong tradition among Danish healthcare professionals (HCPs) of welcoming and involving patients' relatives. During the pandemic, the restrictions have been loosened and tightened several times, challenging HCPs to stay updated and to deal with the implications of these restrictions for patients, relatives, and staff. At times, enforcing the shifting restrictions has been a challenging task for frontline nurses [12].

To manage the restrictions, charge nurses have played a vital role in this process. In a Danish study, hospital charge nurses with formal management education and leaders with more than five years of experience more effectively managed the COVID-19 situation [13]. However, shifting visitor restrictions during the pandemic may have complicated charge nurses' management efforts. Therefore, we aimed firstly to describe how the shifting visitor restrictions were passed on from the national authority level to the charge nurses in a university hospital and secondly to describe the charge nurses' efforts to manage the shifting restrictions in bed wards and outpatient clinics and their challenges doing so.

2. Design and Methods

2.1. Design. The study was conducted in two parts, according to its aims. Part 1 was a document analysis describing the shifting visitor restrictions in the process from decision making to their operationalisation in clinical practice. Part 2 was a cross-sectional survey exploring charge nurses' efforts to manage the shifting restrictions and their challenges doing so. We followed the CROSS guidelines for surveys [14].

2.2. Methods

2.2.1. Part 1: Document Analysis. The document analysis was inspired by the guidelines for document analyses (CARDA), including recommendations for description of the data collection procedure and a data analysis [15].

(1) Legislative Context. In a Danish legislative context, the Danish Ministry of Health determines the overall regulatory and supervisory functions of national healthcare, while the five Danish regions are primarily responsible for the administration of Danish public hospitals [16, 17]. The Danish Epidemic Act, which dates to the plague epidemic in 1665, authorizes the Ministry of Health to issue restrictions to prevent infectious diseases from spreading in or outside of Denmark [18]. Under this act, managing pandemics was considered a public area of responsibility and applied to the entire population [19]. The Epidemic Act takes precedence over all other national legislation, except the Danish Constitution [20, 21].

(2) Data Collection. A comprehensive collection of publicly available electronic documents was retrieved by the researchers HM and TWV between March 2020 and June 2021. The data comprised various sources, including public health policy documents, institutional formal letters, and minutes of meetings of the regional council and hospital administration. The data were retrieved from national authorities, hospital websites, intranet pages, and institutional instructions and files. To ensure the thoroughness of the document collection, the process was extended to references and attachments associated with the primary materials. Six key words were used in the search for documents: Visitor restrictions, hospital visitor restrictions, relative, coronavirus, COVID-19, SARS-CoV-2, and pandemic. All documents containing instructions or orders regarding restricting relatives' access to public and private hospitals were included in the analysis.

(3) Data Analysis. The analysis procedures involved systematic reviewing of all collected data sources. To describe the information paths among authorities and hospital organizations in the enforcement of the visiting restrictions, a systematic content analysis of the documents was conducted in two phases [22]. The initial phase aimed to describe the information cascade in the decision-making processes related to hospital visitation

restrictions. This included identifying the individuals or organizations responsible for determining, authoring, and managing the restrictions, as well as the recipients to whom these directives were forwarded and again passed on to finally be implemented in practice. The second phase of the content analysis focused on tracking changes and developments over time regarding the visitor restrictions, focusing on how they were clarified, loosened, or tightened in both the first and second waves of the pandemic.

2.2.2. Part 2: Cross-Sectional Survey

(1) *Questionnaire Development and Validation.* Based on relevant literature and experience, the five authors developed a questionnaire. Besides questions about background characteristics of the respondents, the questionnaire included five multiple-choice questions:

- (1) How did you as leader get information about current visitor restrictions? (7 options)
- (2) How did you pass on the information about visitor restriction to your staff? (5 options)
- (3) How clear was the wording of the visitor restrictions to understand? (3-point Likert scale)
- (4) How did you as leader experience handling the visitor restrictions in practice? (3-point Likert scale)
- (5) How often have you deviated from visitor restrictions paying regard to patients and their relatives? (5-point Likert scale)

Also, the questionnaire included three open-ended questions allowing charge nurses to elaborate on selected aspects of their experiences or highlight important issues that were not otherwise addressed in the study:

- (a) Did you have any doubts about visitor restrictions, and if so, how were you able to clarify your doubts?
- (b) As charge nurse, is there anything you would do differently if a similar situation should occur in the future?
- (c) Is there anything else you would like to add?

The questionnaire was validated by cognitive interviewing [23] of four charge nurses representing the target group. They were asked individually to complete the questionnaire with one of the authors by their side. By using the think aloud principles [24], the charge nurses were asked about their understanding of the questions, considerations about the answers, and the relevance of the questions. The charge nurses found that some questions could be answered differently, depending on whether they were thinking about the first or second wave of the pandemic. Therefore, three of the multiple-choice questions were divided into sections concerning the first and second waves, respectively. In addition, some questions were revised for clarification. The

revised questionnaire was then converted into an electronic version, which again was pretested by two charge nurses; no further revision was needed. After adjusting the visual layout, a final version to be used in the study was accepted.

(2) *Study Population and Sampling.* In April and May 2021, the electronic questionnaire was emailed to 88 charge nurses in the hospital's somatic wards, including bed wards, outpatient clinics, short-term units, same-day surgery units, intensive care units, and mixed units. To further create attention to the survey, when launching it, the authors also announced the survey through their hospital networks. After two weeks, a reminder was emailed to those nurses who had still not responded. The online survey was created using Research Electronic Data Capture (REDCap), a safe software database for research studies, which does not allow answering the questionnaire twice [25].

(3) Analysis of Survey Data

Quantitative Data. The quantitative data were transferred from REDCap to Stata version 17.0 (StataCorp LLC, College Station, TX). The charge nurses' characteristics were analyzed using simple descriptive statistics. Each of the five multiple-choice questions was calculated as percentages. No imputations were made on missing data.

Qualitative Data. The qualitative analysis of the responses to the three open-ended questions was inspired by Graneheim and Lundman's content analysis method [26]. Initially, the responses were read several times by all the authors, to get an overall understanding of the data, while making individual notes of impressions and first analytic ideas. Next, authors ASÅ, TWV, and GSR developed initial codes by systematically identifying and labelling meaning units from the text that seemed to capture key aspects. Concurrently, they identified categories in the data and summarized illustrative analytic points. The qualitative data collected through the electronically administered questionnaire did not allow us the possibility to go back and ask the respondents to elaborate on their comments. Consequently, the focus of the analysis was primarily on a manifest level (what the text says) rather than on a latent level (what the text talks about). For each of the three open-ended questions, the analytic process was repeated. During the entire process of analysis, attention was paid to the fundamental importance of researcher reflexivity, i.e., a researcher's critical self-reflection about her or his own personal background, preferences and preconceptions, and their influence on the study [27]. To further strengthen reflexivity and increase the credibility of the findings, in the final steps of the process, authors HM and MG were involved for new rounds of reflective discussions until consensus among all authors was reached on the final description of the findings [28].

2.3. Ethics. The study was approved by the board of directors at Aarhus University Hospital. According to the Danish Ethical Committee Law § 14, subsection 2, ethical approval by the Central Denmark Region Committees on Health Research Ethics or by the Danish Committee on Health Research Ethics was not required for this type of study. Written permission to e-mail the questionnaire to the departments' charge nurses was obtained from the senior nurse manager in each hospital department. Information about the study, voluntary participation, and anonymity was provided in the initial e-mail to the charge nurses as well as in the introductory text of the questionnaire. Completing the survey was considered consent to participation. When completing the survey in REDCap, all participant information was anonymised, preventing any direct or indirect identification of individual participants. The study was conducted according to the principles of the Declaration of Helsinki [29].

3. Results

3.1. Part 1: Document Analysis. The Epidemic Act was the legal framework for Denmark's lockdown, which was proclaimed on 18 March 2020 by the Danish Prime Minister. The comprehensive societal restrictions were based on a precautionary approach to prevent the spread of the virus [30]. The document analysis showed that, when changes were decided by the Ministry of Health, restrictions were carried into effect via an administrative cascade (Figure 1).

The Danish Patient Safety Authority instructed the Regional Councils in the five Danish regions to issue orders to restrict relatives' access to public and private hospitals. From the Regional Councils, the restrictions were passed on to hospitals' boards of directors and from there to all hospital heads of department. They, in turn, communicated the restrictions to their charge nurses. At the endpoint of the administrative cascade, frontline healthcare professionals carried the restrictions into effect in their clinical practice. In addition, hospital administrations took steps to continuously update the regional and hospital-based electronic guidelines on visitor restrictions and to post information about restrictions on the hospital's web page.

The visitor restrictions were clarified, loosened, or tightened eight times between March 2020 and April 2021 (Figure 2), reflecting the fluctuating infection rates. In March 2020, in the early days of the first wave, Denmark went into lockdown, which led to a strict no-visiting policy at the hospitals. One month later, this general protective measure was clarified by defining the term "close relative" as family in a straight line or, according to a specific assessment, a close relative. Furthermore, the term "minors" was defined as a child under the age of 18. Also, if a patient suffered from cognitive impairment, it was considered a critical reason for still allowing family visits.

Due to a decrease in infection rates in June 2020, two relatives were allowed to visit all patients, and in July, all restrictions were lifted. In cases of future local increases in infection rates, temporary restrictions applying to the affected regions only could be issued. Due to a local increase in

the infection rate in August 2020, only one visitor per patient was allowed at our hospital. One month later, the local infection rate was acceptable, and consequently, the visitor restrictions were lifted. Still, all visitors were instructed to wear a face mask during their entire hospital visit. In November 2020, the second wave hit Denmark, and once again the visitor restrictions were tightened, allowing visits from one close relative only. The high infection rates faded three months later, and visitors were once more allowed in hospitals. However, hospital-based restrictions could still be issued if the physical surroundings of a ward or unit did not allow for keeping a two-meter social distance.

3.2. Part 2: Cross-Sectional Survey. Out of 88 charge nurses, 71 responded, yielding a response rate of 81%. Nearly all the responding charge nurses were women, and more than half were 50 years or older. They were employed in 29 different departments and primarily from bed wards. Nearly 50% of the charge nurses had more than 10 years of experience as a nurse (Table 1).

3.2.1. Multiple-Choice Questions. During the first and second wave, most often the charge nurses were informed about the current visitor restrictions by the hospital board of directors, their head of department, by regional electronic guidelines, and from the hospital intranet (Table 2). Overall, this information was passed on to the staff at daily meetings and through newsletters and work e-mails. During the first wave, 68% of the charge nurses found the wording of the visitor restrictions clear or very clear and during the second wave it was 86%. One-third of the charge nurses found it challenging to handle the restrictions in practice. During the first wave, 68% of the charge nurses stated that they deviated from the restrictions weekly, or even daily, and during the second wave, it was 74%. No differences in the pattern of responses were found between the first and second waves of the COVID-19 pandemic.

3.2.2. Open-Ended Questions. The qualitative findings complement the results described in Table 2. One of the charge nurses reflected, "We were creating the path while running," and this specific quote summarizes a wide range of the charge nurses' experiences during the hospital's visitor restrictions, as summarized below.

The charge nurses' doubts about the restrictions were mostly related to insecurity about how best to apply the general restrictions in the specific clinical setting of their unit. During the first wave of the pandemic, they gradually realized that there was room to manoeuvre with supplementary professional considerations to safely deviate from the general restrictions in specific patients' cases. Handling restrictions challenged relations and collaborations both within and outside the ward and required substantial communication efforts from the charge nurses.

Being prepared was a subject commonly mentioned by the charge nurses, in terms of thinking ahead and using virtual and written materials to support communication



FIGURE 1: The administrative cascade for information on visitor restriction.

	First wave				Second wave		
Visitor restrictions	Clarifications	Loosening	Loosening	Local tightening	Local loosening	Tightening	Loosening
No visitors allowed in hospitals. Exceptions: 1. Close relatives of the critically ill. 2. Parents of minors. 3. Giving birth. 4. Other heavy-weighted reasons for an urgent visit.	1. Close relatives were defined. 2. 'Minors' were defined. 3. Other heavy-weighted reasons were clarified.	1. Possibility of visits in outdoor areas. 2. One or two designated visitors indoor. 3. Possibility for the patient to participate in home visits.	1. Visits to patients can be made without any restrictions 2. The Danish Agency for Patient Safety is given the opportunity to issue temporary local restrictions.	1. One visitor per patient. 2. Children and young people allowed up to two visitors. 3. All visitors must wear masks.	1. No visitor restrictions and no requirements for masks (loosening from the Danish Agency for Patient Safety to the Region).	1. Visit of one close relative defined as family in straight line (permission for the Region to issue deviations). 2. Up to two relatives of children.	1. Visits could be made without any restrictions beside wearing masks. 2. The two-meter distance requirement could lead to local tightening on the number of visitors.
March 2020	April 2020	June 2020	July 2020	August 2020	September 2020	November 2020	April 2021

FIGURE 2: Changes in visitor restrictions from March 2020 to April 2021.

TABLE 1: Characteristics of 71 charge nurses.

Characteristics	<i>n</i>	(%)
Sex		
Female	67	(94.4)
Male	4	(5.6)
Age, years		
<40	10	(14.1)
40–49	18	(25.3)
≥50	43	(60.6)
Type of ward/unit		
Bed ward	31	(43.7)
Outpatient clinic	17	(23.9)
Short-term unit/Same-day surgery unit	7	(9.8)
Intensive care unit	4	(5.6)
Mixed units or other	12	(16.9)
Experience as a charge nurse, years		
<5	23	(32.4)
5–10	31	(21.1)
>10	29	(46.5)

with patients and relatives. In addition, providing more context-specific information on restrictions was a suggestion for reducing conflicts with relatives. The importance of leadership was evident for the charge nurses, and some highlighted values such as trust, human relations, and common sense in the process of making decisions about visiting.

During the pandemic, it became a basic condition for charge nurses to handle varying visitation restrictions. A clear and concrete information flow was vitally important, and when the information was delayed or not well-synchronised with information given to the public, it caused confusion and disturbances among staff. The charge nurses described how restrictions had both upsides and

TABLE 2: Charge nurses' information sources, understanding, handling, and communication of the visitor restrictions.

Research question	Options	First wave		Second wave	
	N = 71	n	(%)	n	(%)
How did you as leader get information about current visitor restrictions? [†]	Hospital board of directors	37	(52)	39	(55)
	Head of department	36	(51)	39	(55)
	Regional electronic guidelines	42	(59)	43	(61)
	Hospital hygiene team	14	(20)	11	(15)
	Hospital intranet (website)	53	(75)	54	(76)
	News media	5	(7)	7	(10)
	Other sources ^{‡§}	9	(13)	10	(14)
How did you pass on the information about visitor restriction to your staff? [†]	Daily meetings	50	(70)		
	Work e-mails	43	(61)		
	Weekly meetings	17	(24)		
	New letters	52	(73)		
	Posters	24	(34)		
	Other sources [¶]	6	(6)		
How clear was the wording of the visitor restrictions to understand?	Very clear	24	(34)	35	(49)
	Clear	24	(34)	26	(37)
	Unclear	15	(21)	9	(13)
	(Missing)	8	(11)	1	(1)
How did you as leader experience handling the visitor restrictions in practice?	Easy	24	(34)		
	Normal	22	(31)		
	Challenging	24	(31)		
	(Missing)	1	(1)		
How often have you deviated from visitor restrictions paying regard to patients and their relatives?	Never	3	(4)	2	(3)
	Rarely	11	(16)	12	(17)
	Monthly	8	(12)	5	(7)
	Weekly	34	(49)	38	(54)
	Daily	13	(19)	14	(20)
(Missing)	2	(3)	0	(0)	

[†]More than one option was possible. [‡]First wave: not relevant ($n = 3$), patients and family ($n = 1$), the National Health Authority ($n = 3$), posters ($n = 1$), and other charge nurses ($n = 1$). [§]Second wave: not relevant ($n = 3$), patients and family members ($n = 1$), the National Health Authority ($n = 3$), other charge nurses ($n = 1$), development charge nurse ($n = 1$), social media ($n = 1$). [¶]By the department's intranet ($n = 1$).

downsides for both staff and patients. Furthermore, the physical surroundings of the wards limited the possibilities for deviating from restrictions.

4. Discussion

Restrictions were communicated in an effective administrative cascade from the Danish Ministry of Health and further on to charge nurses, who led their implementation in each hospital unit. The majority found the wording of the restrictions clear, while one-third found them challenging to handle. Both upsides and downsides to the absence of relatives were identified. To balance the needs of patients, relatives, and staff against the need to prevent the spread of the virus, the charge nurses gradually developed ways to deviate from the restrictions. Communication, collaboration, and leadership were experienced as key tools in the processes of adapting shifting restrictions.

4.1. Information Pathways and Communication. The study showed that the information pathway through the Danish healthcare system was considered transparent and coherent

during the first year of the pandemic. Along the way, eight shifts in visitor restrictions were made. According to the Organization for Economic Cooperation and Development (OECD), in the OECD Digital Government Index 2023, Denmark was ranked second-best among 38 countries [31]. Also, in the Digital Economy and Society Index 2021, published by the European Commission, Denmark was ranked first [32], indicating a solid digital infrastructure in public governance and that digital skills are generally high among the Danish population. This probably laid the groundwork for the effective digital communication cascade from national guidelines to frontline nursing practices in our hospital. In the current study, the charge nurses found the wording of the visitor restrictions clear, or even very clear. In contrast, Harrison et al. conducted a study scanning policy documents and websites describing COVID-19 adult inpatient visitor restrictions at 70 American medical centres [33]. They found that the information was unclear, inconsistent across the centres, and lacked important details. However, even if the Danish charge nurses generally found the wording of the shifting restriction policies clear, enforcing them was still a complex task when confronted with patients and relatives who perhaps were not informed

to the same degree of detail. The charge nurses suggested that should another pandemic occur, the Danish public should be better informed that differing physical surroundings in hospital units would allow differing levels of restrictions.

The importance of communication in handling and implementing the visitor restrictions cannot be overstated. Effective communication is critical to managing any crisis or public health emergency, and COVID-19 has been no exception. In the current study, one-third of the charge nurses found it challenging to manage the visitor restrictions in practice. As shown in Tables 3–5, several challenges were related to communication in the unit and the hospital organization as well as with patients and relatives. In another Danish study, hospital charge nurses with formal management education and leaders with more than five years of experience more effectively managed the COVID-19 situation [13]. In the current study, testing a possible association between years of experience as a charge nurse and their perceptions of the challenges related to managing the shifting visitor restrictions could provide valuable insights. However, the limited sample size of 71 charge nurses precluded such analysis. Therefore, larger studies are needed to investigate this relation.

Leadership has been defined as "... the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives" [34]. One of the key components in leadership is clear and timely communication. As healthcare environments are complex webs of people and resources, communication processes need to extend upwards and laterally within the organization [35]. Simonovich and colleagues described the importance of effective communication in nursing practice across three levels during the pandemic: organizational leadership, unit leadership, and nurse-to-nurse communication [36]. Furthermore, during the pandemic, the important communication with patients and relatives about the shifting restrictions and their implications for the practice in each unit represented a fourth level of communication. Complex examples of communication-related to all four levels are reflected in the current study. As illustrated, handling the restrictions challenged relations and collaborations both within and outside the ward and required substantial communication efforts from the charge nurses. It is one of many examples that the COVID-19 crisis has presented exceptional challenges for charge nurses.

4.2. Managing Shifting Visitor Restrictions. In Denmark during the pandemic, the approach to restrictions changed from being general to more specific and local. When hospitals were allowed to welcome visitors again, it was up to each department to decide the number of visitors allowed, according to their social distancing requirements. At the beginning of the pandemic, from March through May 2020, no visitors were allowed access to the hospitals. In the US, visitor restrictions were more local. Harrison et al. reported that, across 70 medical

centres, visitor restrictions varied during a similar period [33]. Seventeen percent did not allow any visitors, and 73% allowed one visitor while the last 10% did not describe the number of visitors allowed. For hospitalised patients with COVID-19, 63% of the centres outlined visitor policies different than those for patients without COVID-19. In contrast, the visitor restrictions in Denmark applied to all hospitalised patients, whether suffering from COVID-19 or not. However, the consistency in visitor restrictions in Denmark was probably due to the size of the Danish healthcare system compared to the American system.

Almost all charge nurses in our study deviated from the restrictions in force. Deviations from the restrictions were wide-ranging in our study, even in an international context. The efficiency of the digital communication cascade from national guidelines to frontline nursing combined with charge nurses' communication and leadership practices may have allowed for a high level of flexibility in managing the visitor restrictions in the individual units. We found the charge nurses deviated from the restrictions to allow relatives of both hospitalised adults and child patients to visit. Across 23 states in the US, exceptions to visitor restriction policies during the COVID-19 pandemic were found in 63 out of 65 hospitals [37]. Setting-specific exceptions included paediatrics, obstetrics/gynaecology, emergency departments, behavioural health, inpatient rehabilitation, surgery, and outpatient clinics. In paediatric units across 36 hospitals in the US, 97% of the units allowed at least one visitor, which underlines how parents are considered the most essential partners in the care of a child [38]. In our study, the charge nurses described exceptions in similar types of settings and further added geriatric wards and intensive care units. Similar results were found in a study of Scandinavian intensive care units [39]. Furthermore, across the different settings, the charge nurses identified patients suffering from a variety of cognitive deficits as one group of patients in particular need of support from their relatives, both when hospitalised and during outpatient treatment. This is an indication that, most likely, all types of clinical settings experienced how the support and involvement of relatives was needed in a wide range of patient pathways; this requires a continued postpandemic nursing focus.

From a societal perspective, deviating from the restrictions to meet complex needs of patients and relatives could be seen as an admirable act of compassion. On the other hand, if deviating could increase the risk of spreading the virus, it could also be seen as a risky practice opposing the general and organizational policies and jeopardizing the health of patients, relatives, and staff. When judging the charge nurses' practice, the relatively low level of total cumulated COVID-19-related deaths in Denmark of 143 per 100,000 people [40] should be considered. Furthermore, as highlighted above, the charge nurses "were creating the path while running." During the first wave, when knowledge about the disease increased and more protective equipment became available, they gradually learned there could be room to manoeuvre to safely deviate from the restrictions in specific patients' cases.

TABLE 3: Summary of findings from open-ended question 1.

Open-ended question 1: Did you have any doubts about the visitor restrictions, and if so, how were you able to clarify your doubts?	
Category	Illustrative analytic points
Identifying particularly critical situations	(i) Doubts occurred in particularly critical situations related to the care of, for example, dying patients, patients suffering from cognitive deficits, the critically ill, parents of a child or adolescent patient, or young siblings. Also, when staff had to discuss critical treatment issues with a patient, the charge nurses would have preferred relatives to be present. (ii) During the pandemic, increased knowledge of the disease and the availability of more protective equipment allowed charge nurses to safely deviate from the restrictions in certain patients' cases
Clarifying doubts through communication	(i) The charge nurses discussed uncertainties with their heads of department, fellow managers, ward staff, patients and relatives, the hospital hygiene team, or the hospital's corona hotline (ii) Clarifying doubts was time consuming
Leadership and collaboration	(i) Sometimes the restrictions were managed with variations, causing confusion and frustration among patients, relatives, and staff, such as when a patient was transferred from one ward, department, or hospital to another. This was a challenge to the relationships between staff and patients or relatives and to the collaborations among units, departments, and/or hospitals. (ii) The charge nurses found some nurses fully capable of making decisions about deviating from the general restrictions, and they seemed comfortable doing so. Other charge nurses experienced that the nurses wanted the charge nurse to make the decision about visiting in each patient's case, to feel protected by her authority.

TABLE 4: Summary of findings from open-ended question 2.

Open-ended question 2: As a charge nurse, is there anything you would do differently, if a similar situation should occur in the future?	
Category	Illustrative analytic points
Being prepared	(i) The evolving pandemic and the rapidly changing guidelines made the charge nurses feel a step behind things, as leaders. Thus, in a future situation, they wanted to be better at thinking through and planning different scenarios, so they could be ahead of things and reduce stress. (ii) The charge nurses would have liked to be better prepared for virtual communication with relatives, including having the relevant electronic equipment at their disposal (iii) Further use of posters and information pamphlets explaining the restrictions in specific contexts, such as single/multi-bed rooms, intensive care units, wards, or outpatient clinics would have been helpful
Enforcing precise communication and transparent leadership	(i) Some charge nurses reported that it would have been nice if it had been made more clear to the public that the physical surroundings differ among wards, and consequently wards need to have differing restrictions. Highlighting this information might have reduced conflicts with relatives who did not understand the restrictions. (ii) Some charge nurses wondered if an information dissemination task force would have been helpful (iii) To avoid unnecessary issues related to interpreting and acting upon the restrictions, the charge nurses described the need for transparent leadership and communication in the organization, both upwards and downwards
Worrying less when deviating from visitor restrictions	(i) The charge nurses had accepted that, when applying visitor restrictions, "one size does not fit all." After some time, they worried less about making compromises when balancing rules and humanity. (ii) Some of the charge nurses suggested trusting the frontline nurses' professional assessments more and using common sense for the sake of the patients

4.3. *Supporting Patients and Relatives.* Our findings show that, during the serious health crisis of the pandemic, acknowledging the value of family bonds and the role of relatives has been an incentive for the charge nurses to prioritise relatives' presence or to facilitate alternative means

of communication. Thus, national restrictions do not seem to capture the complexity at the individual level. Moral distress can occur if an individual is unable to act in accordance with their moral judgment owing to external barriers [41]. The charge nurses reported frequently

TABLE 5: Summary of findings from open-ended question 3.

Open-ended question 3: Is there anything else you would like to add?	
Category	Illustrative analytic points
Delays in the information flow	(i) Information from the hospital's administrators should be clear and concrete, directing fast production of ward-based guidelines (ii) Although charge nurses learned to live with delays in the information flow, it caused anxiety among patients, relatives, and staff, with the latter often having to cope with disturbances that might have been avoided
Upsides and downsides to the absence of relatives	(i) When relatives were not allowed access to the wards, they did not interfere with staff in the timing of their professional work (ii) Relatives' absence left the ward environment more tranquil for both patients and staff, which was described as a relief (iii) Relatives' absence allowed the patients to rest and recover more (iv) Normally, relatives represent a valuable supplementary resource in everyday nurse-patient collaborations, as many things are not possible if the relatives cannot participate (v) When adhering strictly to the restrictions, it was difficult for staff to be confronted with the sadness and powerlessness of patients and relatives
The continued managing of social distance requirements	(i) Even when restrictions were loosened, the requirements regarding social distancing still applied, challenging the arrangement of the physical surroundings of the wards

deviating from the national restrictions as they sought to weigh the interests of the individual patient and his or her relatives against the existing visitor restrictions. Other studies have reported high levels of moral distress among staff witnessing the suffering of patients and relatives who were separated [2]. Obviously, hospitals must ensure the safety of both patients and staff, and the more visitors allowed in the hospital, the more difficult social distancing becomes [42]; however, Valley et al. question whether no-visitor policies are essential for infection prevention at all, and to what extent restricted visitation might unintentionally foster poor patient health outcomes [43].

If visitors are allowed during a pandemic, hospital units need resources to provide personal protective equipment for visitors, and to patients and staff [44]. In Denmark, protective equipment supplies were scarce during the first wave, and staff were not yet fully trained to apply them, likely causing a general reluctance to allow relatives to visit. However, the charge nurses gradually realized there was room to manoeuvre in specific patient cases, if doing so was expected to significantly improve the quality of care. Downar and Kekewich proposed that healthcare organizations adopt a new end-of-life visitor policy that reduces restrictions overall without necessarily putting patients, staff, and family members at an increased risk of COVID-19 transmission [45]. Selman et al. also have recommended advanced care planning that includes regular communication with family members, accurate information provision, support of virtual communication, and enabling family members to say goodbye in person where possible [46]. In the current study, this was what the charge nurses did when adjusting the national restrictions to the local context of their units.

Recent literature on total visitor prohibitions at hospitals during the COVID-19 pandemic describes how palliative care patients, critically ill patients, children, and cognitively impaired patients need alternatives to the support provided

by relatives accompanying outpatients to hospital appointments, or when visiting inpatients. Kuntz et al. found that the efficient application of telemedicine for family e-meetings can be feasible and effective for decision making related to dying patients and their families [47]. Selman et al. also recommend applying digital communication strategies to meet the needs of patients and relatives [46]. In a study from an American intensive care unit, a dedicated facilitator helped schedule calls and coordinate virtual communications to reduce the frustrations for patients, family, and HCPs [48]. In our study, the charge nurses would have liked to have been better prepared for virtual communication with relatives, including having the relevant electronic equipment at their disposal. Similar findings have been reported from China [44]. We believe that now, that the pandemic is over, digital communication tools will still be useful to further facilitate the participation of relatives in important hospital conversations if the relative lives far away from the hospital or perhaps is at work at the scheduled time of the conversation.

The charge nurses described how the absence of relatives shed light upon both downsides and upsides to relatives' absence. They also realized that "one size does not fit all." In the years to come, perhaps these experiences from the pandemic will inspire hospitals with open visiting policies to develop more differentiated visiting policies, welcoming relatives' presence in some units and perhaps limiting their presence in others, to better protect the patients' interests. Nurses may play an important role in balancing the needs of individual patients with the needs of visitors [49]. Nurses' role as a gatekeeper in a flexible visitation practice has also been described in a study of intensive care units [50]. To promote a family-centred approach, it is essential to involve patients and relatives in the process of designing the hospital visiting policies of the future.

4.4. Strengths and Limitations. This study has certain limitations. In a document analysis, the selection of documents relies on existing information and may introduce bias as certain materials may be more readily available. Also, the documents may lack the context necessary for a comprehensive understanding [51]. However, the Danish authorities and hospitals constantly updated the population with the most recent announcements. The continuous updating could have brought some difficulties accessing previous information on visitor restrictions that had been adjusted or even changed.

The survey allowed us to collect data from 81% of the hospital's charge nurses. Still, nonresponse bias could occur as the sample did not represent the entire group of charge nurses [52]. As it is a single-site study, the results from the survey cannot be considered representative of all charge nurses in Denmark. Still, as the study was carried out in the largest hospital in the country, the data most likely show some general tendencies. However, the results of the survey may not be generalisable to other situations or settings beyond the research context [53].

The questionnaire was developed for the current study as no existing questionnaire was available. Several initiatives were taken to test the quality of the questionnaire, including double testing of the content of the questions, wording, and layout with several charge nurses, ensuring face validity of the questionnaire [54, 55]. The charge nurses' validation feedback encouraged the authors to include all types of units, especially outpatient clinics and same-day surgery units, which created a more complete dataset. Using face-to-face interviews instead of the electronic questionnaire may have provided more detailed data and in-depth elaboration on the open-ended questions. However, considering the fluctuating infection rates during the study period, this method was not considered feasible. The questionnaire was distributed 14 months after the first wave of the pandemic struck in Denmark. Charge nurses' recollections about the first wave may have induced a systematic error blurred by experiences and behaviours from the second wave causing recall bias [56]. However, the charge nurses seemed to have distinct memories from each of the two waves.

5. Conclusion

In Denmark, during the first year of the pandemic, hospital visitor restrictions gradually changed from general to becoming more locally and individually adjusted. A well-organized digital public healthcare information cascade supported the process. Although the information about visitor restrictions was passed through several management levels in the Danish healthcare system, the information generally reached the charge nurses quite effectively.

The charge nurses were informed primarily through other levels of the hospital organization. Even if they generally found the wording of the visitor restrictions clear, one-third found them challenging to handle in practice. Enforcing the restrictions challenged relations and collaborations within and outside the units and required substantial communication efforts from the charge nurses.

When making decisions about visiting, trust, human relations, and common sense were highlighted as important leadership values.

The charge nurses played a significant role in balancing the needs of patients, relatives, and staff while managing visitor restrictions during the COVID-19 pandemic. When the charge nurses had to balance general restrictions against the individual needs of patients and relatives, professional nursing values were challenged, and the pandemic has shed light upon downsides as well as upsides to the absence of relatives. Increased knowledge of the disease and the availability of more protective equipment enabled the charge nurses, through professional considerations, to gradually deviate more from the general restrictions in specific patients' cases. Seven out of ten charge nurses deviated from the restrictions weekly or daily.

6. Implications for Nurse Managers

In some cases, separation of patients and their closest relative is a paramount burden. When charge nurses deviate from visitor restrictions during a pandemic for the sake of patients and closest relatives, the consequences can extend beyond the immediate healthcare setting with positive as well as potentially negative implications for both the individuals involved and the healthcare institution. The charge nurses' experiences from the pandemic can contribute to further qualifying nurse managers' considerations when designing family-centred hospital visitor policies for the future. Also, they may strengthen the handling of future sudden major organizational changes. Charge nurses require support from both society and hospital managers during a pandemic with visitor restrictions to effectively navigate the challenges they face. This support may come in various forms, including emotional assistance, resource allocation, clear communication strategies, and recognition for their vital role in maintaining healthcare delivery.

Data Availability

The data underlying this article can be shared on reasonable request to the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

All authors contributed substantially to designing the study, collecting and analyzing the data, preparing the manuscript, and approving the final version for submission.

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Research Article

Measuring the Nursing Work Environment during Public Health Emergencies: Scale Adaptation and Validation

Xi yi Wang ¹, Jing Shao,² Jiaqi Lian,¹ Aozhou Weng,¹ Jianhong Chang,³ Mengting Ji,⁴ Caifeng Wang,¹ Qiong Fang,¹ Zhihong Ye,⁵ and Yun Hu ¹

¹School of Nursing, Shanghai Jiao Tong University, Shanghai 200025, China

²Institute of Nursing Research and Department of Nursing of Fourth Affiliated Hospital, Zhejiang University School of Medicine, Hangzhou 310058, China

³SAS Institute, Inc, Cary, NC 27513, USA

⁴Renji Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai 200127, China

⁵Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, Hangzhou 310016, China

Correspondence should be addressed to Yun Hu; huyunsy@shsmu.edu.cn

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Aim. To develop a scale for measuring nurse's perceived work environment during the public health emergencies (PHEs) and assess its reliability and validity. **Background.** Although there is extensive research on instruments for measuring nursing work environments in regular healthcare settings, there is a lack of specific scales tailored to address the unique work conditions experienced by nurses during PHEs. **Design.** This study employed a cross-sectional design for psychometric evaluation and adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement. **Methods.** A self-report scale, the Chinese Nursing Work Environment Scale for Public Health Emergencies (C-NWE-PHE), was developed, integrating situational characteristics. Data on demographics, adapted scale scores, and subjective evaluations of nursing management performance were collected from 1156 nurses through online surveys conducted between January 2023 and March 2023. Confirmatory factor analysis, Pearson correlations, and Cronbach's alpha analyses were conducted to evaluate the psychometric properties of the scale. **Results.** The adapted C-NWE-PHE scale comprised 28 items organized into five subscales: Workforce and Deployment Support, Leadership and Emergency Management, Autonomy and Empowerment, Teamwork and Collaboration, and Logistics and Humanistic Care. Structural equation modelling showed satisfactory factor loadings for each subscale and a good model fit, confirming construct validity. The content validity and reliability of the total scale were confirmed. **Conclusion.** This study provides empirical evidence for understanding and assessing the nursing work environment during PHEs with a psychometrically sound scale. **Implications for Nursing Management.** The C-NWE-PHE scale, along with its five identified constructs, provides a nuanced comprehension of working conditions amid PHEs. Implementing this scale could foster specific enhancements, support nurse retention efforts, and enhance the effectiveness of responses during challenging emergency situations.

1. Introduction

The COVID-19 pandemic has sparked widespread discussions regarding the burnout and psychological well-being of nurses [1–3]. These issues have had a significant impact on nurses' commitment to the nursing profession and their contributions to fighting against public health emergencies (PHEs) [1, 4]. Nurses worldwide have reported experiencing

a poor work environment during the pandemic, resulting in negative work outcomes, low job satisfaction, and increased turnover intentions [5, 6]. Numerous studies have provided compelling evidence that establishing a healthy work environment is an effective strategy for mitigating job burnout, retaining nurses, and promoting sustainable development [7–9]. Given the urgency of the matter, it is vital to explore the concept, core components, and assessment tools to guide

investments in establishing supportive environments at the organizational level [5, 7, 10–13]. These initiatives should be specifically tailored to crisis management contexts and encompass generalizable managerial strategies to enhance nurses' contributions to respond to future PHEs.

Public health emergencies (PHEs) are characterized by their causes and events that pose a threat to overwhelm routine capabilities due to their scale, timing, or unpredictability [14]. The recent COVID-19 pandemic serves as a prime example of a PHE that requires international attention and emergency response [10, 12]. PHEs have underscored the importance of specific working conditions, policies, health regulations, and operational practices in effectively addressing the challenges [15]. Measures taken by various countries, such as establishing designated hospitals, mobile cabin hospitals, and temporary treatment centres, have played pivotal roles in strengthening healthcare system capacity and capabilities during the COVID-19 pandemic [15–17]. Alongside expanding functional capabilities, there have been suggestions for enabling multisectoral organizational strategies and mobilizing human resources to enforce health security capacities worldwide [15, 18]. However, these measures have also introduced additional complexities for organizations, particularly in terms of ensuring nurse engagement, supporting their well-being, and fostering sustained commitments. To prepare healthcare systems for PHEs, it is important to optimize the work environment, improve the work performance, and enhance the well-being of nurses.

The nursing work environment is a multidimensional concept that significantly influences nursing practice and patient outcomes [19]. Researchers have labelled its concept domains differently, such as work values, nurse satisfaction, perceived productivity, organizational traits, autonomy, control, collaborative relationships, patient-centred care, and organizational support, etc. [20–22]. Nurses' perceptions of their working environments during the COVID-19 pandemic have been extensively explored through qualitative interviews, revealing significant challenges such as increased workload, safety concerns, emotional stress and burnout, inadequate resources, and professional and personal sacrifices [3, 23–25]. Nurses have made remarkable displays of resilience and adaptive capacity, with factors like camaraderie, recognition, and appreciation playing a vital role in mitigating the impact on their well-being [26, 27]. To enhance working conditions and prioritize initiatives, practical actions should be taken, such as ensuring staff adequacy, competence, empowerment, and equitable distribution [27–30]. Additionally, the six Pathways to Excellence Standards, which include shared decision-making, leadership, safety, quality, well-being, and professional development, were developed and implemented [27]. However, there is still a need for a comprehensive understanding of how emergency response and managerial strategies affect the practice environment and nurse outcomes during PHEs [27, 31, 32]. Effective measures that incorporate accountability-oriented evaluations can enable external comparisons and internal efforts for improvement [14]. To gain deeper insights into the work environment during

PHEs, quantitative approaches are necessary, providing a solid foundation for assessments and understanding their impact on nurse performance, thereby informing strategies to improve nursing practice and outcomes.

Previous literature reviews on measuring work environments have highlighted that existing questionnaires primarily focus on general hospital settings and evaluate physical environments within healthcare facilities [20, 33]. However, emerging evidence in the COVID-19 era underscores significant differences in nurses' needs and essential support resources, encompassing logistics, emotional well-being, patient care, teamwork, and protective trainings, all crucial elements contributing to a healthy work environment [4, 34, 35]. Moreover, recent studies have demonstrated a noteworthy link between nurses' perceptions of work conditions and job outcomes, including their perceived workload, staffing adequacy, leadership, and overall organizational performance [35–37]. Initial investigations into suitable staffing solutions and their impact on the work environment, utilizing the practice environment index in acute care settings, revealed potential predictive relationships between these variables [4, 38]. As of now, there remains a lack of a specific scale for measuring and assessing work environments in emergency situations related to PHEs. To address this gap, it is practical to adapt a self-reported assessment tool based on previous evidence in measuring nurses' work environment in normal healthcare settings, thereby enhancing domain specificity and addressing situational phenomena [39, 40]. Through modifications in item wording, the scale can be refined to align with the situational context, and further validity evidence can be gathered, typically through confirmatory factor analysis [39]. This strategy allows for the adaptation of an established assessment tool, providing deeper insights into the dynamics of the work environment, particularly within the context of PHEs.

In an effort to comprehensively assess the nursing work environment and provide insights on a global scale, a meticulously developed Chinese Nursing Work Environment (C-NWE) scale was selected for adaptation. Originating in 2010, this scale was constructed based on the principles of the person-environment fit theory and contextual factors. It amalgamated crucial elements from widely used assessments, including the professional practice environment, nursing work index-revised, and practice environment index. After evaluating empirical data within the Chinese context, researchers noticed that the job-demands resources theory, centred on external influences, didn't fully capture nurses' work environment perceptions. Consequently, the C-NWE underwent refinement, integrating the theory of harmony management to enhance the understanding of individual resources, person-environment interactions, and value alignment within the scale. Initially, a 47-item scale was developed [22], aligning with global efforts exploring nursing work environment traits while integrating the influence of nurses' individual values and empowerments on their work environment [41, 42]. For greater usability, the C-NWE was further condensed into a 26-item scale using rigorous statistical methodologies and employed in

a national survey covering eight economic regions [43]. This extensive survey gathered data from 19,000 nurses across 31 provinces in mainland China [9, 43], demonstrating robust psychometric properties and considerable efficiency. The 26-item version retained elements such as professional development, clinical autonomy, salary and welfare, recognition of value, while further refining aspects related to staffing adequacy, support and care, and nurse-physician relationships, thereby improving the reflective nature of person-environment interactions. These foundational constructs provide a solid theoretical framework for the current study, guiding the analysis of data pertaining to nurses' perceived work environment during the COVID-19 pandemic.

This study seeks to address the complexities of the nursing work environment concept, especially within the context of PHEs and organizational strategies geared towards effective responses to such crises. The primary objective is to construct a dependable scale for assessing nurses' perceptions of their work environment during PHEs. Validating this scale through empirical survey data will establish a robust framework for understanding the underlying theoretical concepts. This comprehension could facilitate targeted improvements in the nursing work environment, ultimately bolstering nurse retention rates and promoting well-prepared and efficient responses to future PHEs on a global scale.

2. Materials and Methods

2.1. Design. Following Heggstad's practical guideline [39], we implemented a systematic approach to adapt a measurement scale within the situational context of the items, known as scale adaptation. The initial phase aimed to generate the scale items and accurately measure the underlying construct in the target situation. Subsequently, in the second phase, we focused on reporting supporting validity evidence specifically among nurses who had experienced an appropriate level of crisis exposure. The study findings were reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [44].

2.2. Scale Adaptation

2.2.1. Item Generation. The C-NWE underwent a comprehensive redesign to cater specifically to the unique challenges posed by PHEs, resulting in the creation of the C-NWE-PHE (Chinese Nursing Work Environment Scale for Public Health Emergencies). The refinement was necessitated by the need to distinguish between a typical hospital nursing work environment and the specific demands of organizational traits for responding to an event of PHE. To thoroughly understand the situational context, an integrative literature review on nurses' experiences during the COVID-19 pandemic was conducted (unpublished), incorporating expert views and identifying the core competencies of nursing professionals in public health emergencies [45]. Specific items were generated from qualitative data obtained through semistructured interviews, enabling

a secondary analysis of 17 nurse managers' experiences with crisis exposure to identify scale constructs. The goal of this process was to adapt the content of the C-NWE scale to accurately reflect emergency-specific traits and working conditions [39]. The generated 28 items were then theoretically categorized into five factors using thematic induction. The research team sought the expertise of nine researchers knowledgeable in nurses' response to PHEs and seven experts to thoroughly review and enhance the alignment between the research instrument and the contextual factors. As a result, a 28-item C-NWE-PHE scale was used for validation research. The scale response options and scoring rules in the current study remained consistent with the 26-item C-NWE scale, ranging from strongly disagree to strongly agree.

2.2.2. Content Validity Verification. A panel of seven experts, consisting of five nursing professors (senior clinical scientists) and two clinical nursing deputies, was invited to evaluate the content validity of the C-NWE-PHE scale. The Delphi survey included the original 26-item C-NWE scale and an overview of its subscales, the 28-item C-NWE-PHE, and an assessment form for content equivalence. Each expert was asked to rate the relevance of each item using a scale ranging from 1 (not relevant) to 5 (very relevant and succinct). Additionally, the experts were requested to provide demographic information, such as their education level, working experience, research areas, and familiarity with the scale's topic, via e-mail. The response rate was 100%, with all experts returning the evaluation surveys. To ensure the reliability of the assessment, three coefficients were calculated: the expert familiarity coefficient (Cs) and expert judgment coefficient (Ca), which yielded values of 0.91 and 0.94, respectively. Moreover, the expert authority coefficient (Cr) was determined to be 0.93, exceeding the threshold of 0.7, indicating an acceptable level of agreement among the experts [46]. Based on the experts' feedback and assessments, the research team conducted a rigorous comparison and discussion of the results to achieve consensus and identify any necessary revisions. Subsequently, an initial version of the C-NWE-PHE scale was developed for a preliminary survey among nurses.

2.2.3. Preliminary Survey. Following the cognitive validity assessment approach [40], a trained investigator invited and recruited 10 nurses who were actively serving on the frontline during the COVID-19 pandemic. These nurses were requested to evaluate the scale from a cognitive standpoint, offering detailed feedback on the comprehensibility of the scale items, relevance to their perceived work environment, and the convenience of the distribution platform employed for data collection. It took approximately 14 minutes to complete the survey.

2.3. Scale Validation. The validation process commenced with workshop discussions and was carried out in a scale-specific manner. Adhering to practice recommendations

[39], we ensured the verification of the scale by employing a fixed set of items, a predetermined response scale, and carefully crafted instructions. We sought responses from nurses with first-hand working experience to ensure the relevance and validity of the scale. The implementation protocol for survey distribution underwent refinement through three rounds of workshops, each involving 10 members. This process resulted in a rigorous validation approach that aligns with the research objectives.

2.3.1. Participants. Using purposive sampling approach, a skilled investigator facilitated the recruitment process and identified eligible nurses who met the following criteria: (1) registered nurses employed full-time in Shanghai tertiary hospitals, (2) possessing at least one year of work experience in current hospitals, (3) having prior experience with and exposure to public health emergencies such as the COVID-19 pandemic, earthquakes, Ebola, SARS, etc., and (4) expressing willingness to participate in the survey.

2.3.2. Instruments. The C-NWE-PHE scale, along with a demographic questionnaire and four subjective questions, was employed to assess the work environment and performance of nursing management from the perspective of nurses. The demographic questionnaire collected information on age, religion, education level, job position, job tenure, workplace, and frontline experiences of eligible nurses. The 28-item C-NWE-PHE scale was presented in a digital format, requiring respondents to rate workplace characteristics on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree), consisting with the rating approach of the original 26-item C-NWE scale.

2.3.3. Data Collection. Between January 2023 and March 2023, a user-friendly digital platform called Chao Xing was utilized for data collection. Chao Xing operates as a mobile learning system, comprising platform and application terminals. It includes features such as a community announcement board and a survey or evaluation mode, accessible through individual user accounts and passwords. This period followed the strict lockdown in Shanghai city experienced by nurses from April 2022 to June 2022, as well as subsequent policy changes. The data collection process was facilitated by a collaborative effort involving three investigators and one data engineer who designed a logically structured digital survey. Each user was permitted to complete only one survey, identified through IP and account authentication. The survey, including a digital survey link, inclusion criteria, and participant consent, was distributed to 12 affiliated hospitals nurses but anonymously to their nursing managers to avoid report bias. To ensure the integrity of the study, researchers maintained a blind approach to the data collection process.

2.4. Data Analysis. Data management was conducted using Excel, and analysis was performed using SPSS 28.0 and SAS Studio software. Two-tailed tests were conducted with

a significance level set at $P < 0.05$. Descriptive analysis was utilized to report the mean and standard deviation (SD) for continuous variables and percentage frequency for categorical variables. Scale validation was conducted following the COSMIN (Consensus-based Standards for the selection of health status Measurement Instruments) checklist [47]. Content validity, including face validity, was evaluated based on expert ratings using the item-level content validity index (I-CVI) and the average scale-level content validity index (S-CVI/Ave). Construct validity was assessed through confirmatory factor analysis (CFA) using structural equation modelling (SEM). Criterion validity was examined by calculating Pearson's correlation coefficients to assess the relationship between C-NWE-PHE scores and quantitative data on the overall assessments of nursing management performance. Reliability analysis included testing the homogeneity of items using Cronbach's alpha, and test-retest reliability was assessed using the intraclass correlation coefficient (ICC) with a two-way mixed-effects model and a consistency definition [48].

2.5. Ethical Considerations. This study was performed in accordance with the Declaration of Helsinki. Ethical approval was obtained from the ethics committee of a university-affiliated hospital (Approval No. RA-2022-397), and the investigation protocol involving 12 affiliated hospitals was approved by the ethics committee of a university (Approval No. SJUPN-HY-202304-3-KS1). All participants gave written informed consent through a digital platform before their inclusion in the study.

3. Results

3.1. Characteristics of the Study Participants. Out of the 3000 nurses invited from 12 tertiary hospitals, a total of 1156 nurses participated and 1059 nurses (91.61%) provided valid responses for the data analysis. As shown in Table 1, the average working experience of the participants was 9.2 years. Most of the participants were female (86.8%) and held primary job positions (82.8%). Most nurses were required to work at least 5 hours per day (60.0%) and fewer than 5 days per week (75.2%). The two most common workplaces were designated hospitals (32.6%) and Fangcang shelters (29.7%).

3.2. Description of the C-NWE-PHE. Figure 1 illustrates the internal structure of the C-NWE-PHE scale, comprising a five-factor solution, which underwent validation by the expert panel and tested through CFA. Drawing from the qualitative interview data and its conceptual interpretation, the key component of each item was presented. Each factor consisted of a varying number of items, ranging from four to six.

The five identified subscales were named in alignment with a comprehensive understanding of the nursing work environment as follows: Workforce and Deployment Support ($F1$), Leadership and Emergency Management ($F2$), Autonomy and Empowerment ($F3$), Teamwork and Collaboration ($F4$), and Logistics and Humanistic Care

TABLE 1: Characteristics of the participants ($n = 1059$).

Characteristics	Participants (n)	(%)
Years of experience (mean, SD)		(9.2, 7.7)
Sex		
Female	919	86.8
Male	140	13.2
Title level		
Primary	877	82.8
Intermediate	169	16.0
Deputy senior or above	13	1.2
Workload		
0–4 hours per day	382	36.1
5–8 hours per day	576	54.4
9–12 hours per day	97	9.2
13 hours and above per day	4	0.4
Workdays		
≤5 days per week	796	75.2
>5 days per week	263	24.8
Workplace (ever and current)		
Local residence community	112	10.6
Fangcang shelter	315	29.7
Public health centre	61	5.8
Designated hospital	345	32.6
Customs airport	20	1.9
Hainan province	176	16.6
Wuhan city	27	2.5
Other places	200	18.9

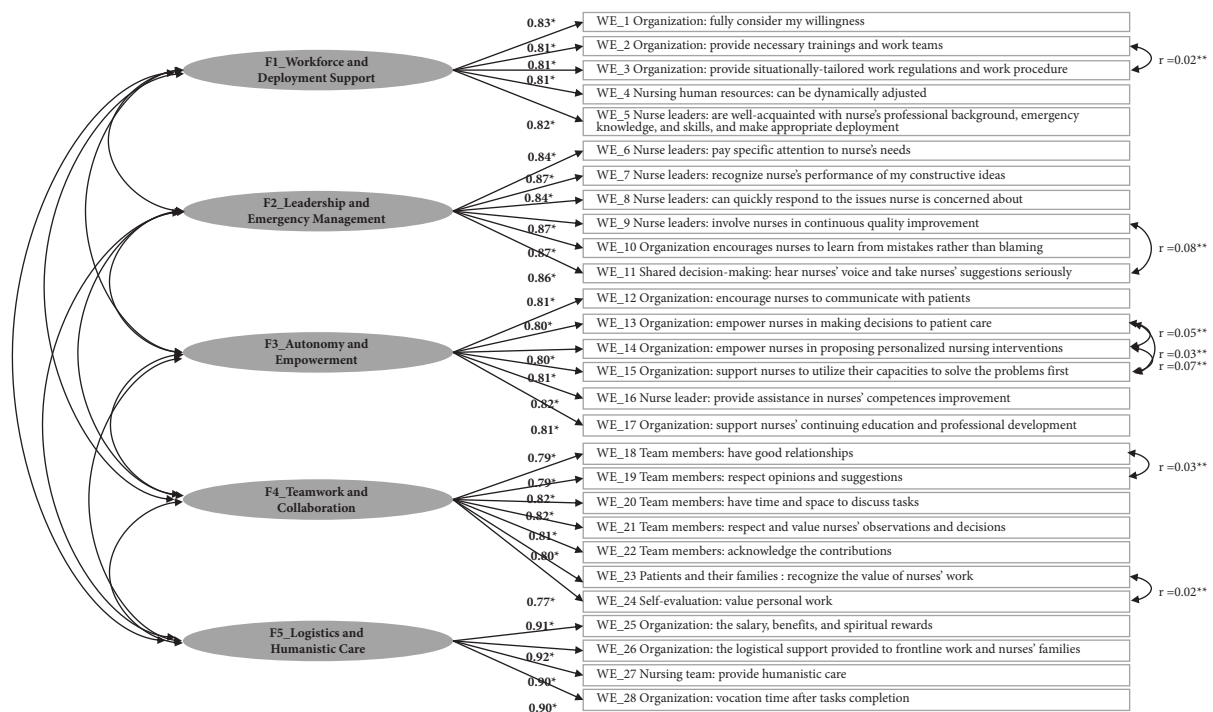


FIGURE 1: Construct of the Chinese nursing work environment scale for public health emergencies. * denotes the factor loading of each item within the corresponding theoretical factor; ** denotes the covariance parameters identified and added to the model.

(F5). Applying the SEM method, the factor loadings of items to each subscale were found to be 0.81–0.83 for F1, 0.84–0.87 for F2, 0.80–0.82 for F3, 0.77–0.82 for F4, and 0.90–0.92 for F5. All subscale scores demonstrated

significant loadings on the first higher-order factor (loadings > 0.49), indicating that the C-NWE-PHE scale effectively measures the various constructs of the nursing work environment during a PHE.

3.3. Content Validity. In comparison to the 26-item C-NWE scale, two additional items were added to the 28-item C-NWE-PHE scale: “The organization and the nursing team can fully consider my willingness to participate in emergency rescue work” and “Nursing team can provide situationally tailored work regulations and work procedures.” The C-NWE-PHE scale was validated by a 7-expert panel, showing a good I-CVI range of 0.85 to 1.00 and an overall S-CVI/Ave of 0.93. Notably, 13 items with an I-CVI of 0.85 exceeded the suggested standard of 0.83, requiring only minor revisions based on the experts’ detailed suggestions. For instance, the term “doctors” in all items of the original scale was changed to “team members,” and “salary” was expanded to include salary, benefits, and spiritual rewards in the PHE context.

3.4. Construct Validity. The model validation was based on a hypothesized five-factor solution. Initially, a model with no covariance between any pair of items was tested. Using Lagrange Multiplier (LM) statistics and residual analysis, specific covariance parameters were identified and added to the model, resulting in an enhanced fit. The identified item pairs, along with their respective correlations and significance levels, were as follows: items 2 and 3 ($r=0.02$, $P < 0.001$), items 9 and 11 ($r=0.08$, $P < 0.001$), items 13 and 14 ($r=0.05$, $P < 0.001$), items 13 and 15 ($r=0.03$, $P < 0.001$), items 14 and 15 ($r=0.07$, $P < 0.001$), items 18 and 19 ($r=0.03$, $P < 0.001$), and items 23 and 24 ($r=0.02$, $P < 0.001$).

Figure 1 displays the fit indices of the a priori theorized factor model, yielding the following results: $\chi^2(333) = 1822.480$, $P < 0.001$, with a χ^2/df ratio of 5.47. The comparative fit index (CFI) was 0.97, the Tucker–Lewis index (TLI) was 0.97, the root mean square error of approximation (RMSEA) was 0.07, the standardized root mean square residual (SRMR) was 0.02, the goodness-of-fit index (GFI) was 0.97, and the adjusted goodness-of-fit index (AGFI) was 0.86. These findings indicate that the model demonstrated a reasonably good fit to the data.

3.5. Reliability. Table 2 illustrates the standardized Cronbach’s alpha coefficients for the total score, indicating a high internal consistency, with a coefficient of 0.99 based on 28 items. Cronbach’s alpha coefficient for the subscales ranged from 0.96 to 0.98. Additionally, the test-retest reliability, assessed among 22 nurses over a two-week period, yielded a coefficient of 0.97.

4. Discussion

This study presents an exploration into the characteristics of the nursing work environment during the COVID-19 pandemic, along with initial evidence regarding the psychometric properties of scores on the C-NWE-PHE scale. The refined items of the scale were validated through expert consultation, rigorously tested using the SEM method, and further supported by score validity and reliability analysis. In comparison to the original 26-item C-NWE subscale

designed for stable hospital settings, the C-NWE-PHE subscale identifies distinct characteristics that reflect the dynamic, challenging, uncertain, and unpredictable environments nurses encountered during the PHE. The identified characteristics include Workforce and Deployment Support, Leadership and Emergency Management, Autonomy and Empowerment, Teamwork and Collaboration, and Logistics and Humanistic Care. These concepts emerged from frontline experiences and were consistently observed among nurses throughout the testing process.

4.1. The Factor Structure of the C-NWE-PHE. The structure and characteristics identified in the C-NWE-PHE scale align with the multifaceted definition of the nursing work environment and conceptualize the situational factors specific to PHE contexts that is resource-limited and changeable rather than static and are closely associated with PHE preparedness and response [11, 12, 21, 27, 49]. Moreover, the study revealed robust relationships among the five elements of the nursing work environment, with association coefficients ranging from 0.85 to 0.97. This finding is consistent with previous research that explored the interconnectedness of these elements as challenges, opportunities, and managerial strategies for frontline environments, supporting nurses and promoting organizational performance [50, 51]. The significance of workforce support and effective leadership within the healthcare system is aligned with the achievement of resilience [52].

The Workforce and Deployment Support prioritizes both workforce capacity and allocation practices concerning deployed human resources and necessary work teams. It encompasses the work regulations and procedures for supporting nurses, making institutional support a crucial aspect of nurses’ perception of a safe work environment. A key focus is on the willingness and suitability of allocating and deploying nurses to ensure optimal staffing and operational effectiveness, also as observed during the response to the Ebola outbreak [53]. This finding is highly relevant in the lessons gleaned from the COVID-19 pandemic, particularly regarding public health governance. It underscores the importance of coordinating service delivery, cultivating sustainable health workforces that leverage a diverse range of skills, establishing training pipelines, and implementing effective operating procedures at the organizational, regional, and national strategy levels [16, 18, 54]. Amid varied conditions encountered during the PHEs, witnessed across different countries, the utilization of nursing staff becomes crucial for coping with nursing shortages [6, 29, 37, 55]. This necessitates proactive measures and preparedness efforts, such as educationally prepared and deployment mechanisms, to address challenges that may arise due to administrative processes and the need for clear job descriptions and maintaining work-life balance [30, 56, 57].

The Leadership and Emergency Management subscale focuses on elements that nurses value in nurse leaders’ efforts to foster a shared governance environment. This involves ensuring that leaders are accessible and facilitate collaborative decision-making, creating opportunities for

TABLE 2: Correlations among C-NWE-PHE subscales ($n = 1059$).

Subscales	F1	F2	F3	F4	F5	Alpha
F1 workforce and deployment support	1					0.97
F2 leadership and emergency management	0.94	1				0.97
F3 autonomy and empowerment	0.93	0.96	1			0.97
F4 teamwork and collaboration	0.93	0.92	0.97	1		0.98
F5 logistics and humanistic care	0.85	0.87	0.87	0.88	1	0.96
Overall scale	—	—	—	—	—	0.99

nurses' voices, ideas, and suggestions to be involved and considered. During the pandemic, nursing leadership demonstrated high visibility and responsiveness towards the needs, concerns, suggestions, and contributions expressed by nurses [52, 58]. It is crucial to implement robust measures that unite and motivate nurses, ensuring that their voices are not only heard and respected but also acted upon [59, 60]. This approach to leadership is based on agile and transformative leadership styles, which are more effective in nursing culture compared to a command-and-control style [61]. Furthermore, nursing leadership that extends to higher levels within organizations, health systems, and governments can result in increased resource allocation to support frontline nurses in their work [62]. The significance of effective leadership at all levels of healthcare governance cannot be underestimated, as it plays a critical role in promoting a supportive and responsive work environment for nurses during challenging times like a PHE, as recognized across international experiences [11, 32, 55].

The Autonomy and Empowerment factor ensures that nurses are equipped with the necessary competence to deliver high-quality care to patients while also prioritizing their personal safety. This factor involves providing nurses with ample support for professional learning, recognizing the significant importance of training and reskilling programs, especially during emergency responses [63]. In contrast to the conventional approach of fostering a positive practice environment through ongoing professional development, the empowerment and facilitation of nurses' professional growth during times of crisis take a different approach, with an emphasis on appropriate education tailored for a "fit-for-purpose" workforce rather than lifelong learning [64]. This targeted focus on acquiring specific skills and knowledge required to handle critical situations equips nurses to confront challenges with confidence and leverage their expertise in acting and performing patient care effectively.

The factor of Teamwork and Collaboration plays a central role in the performance of healthcare organizations, involving not only healthcare professionals but also other members of the team. Effective teamwork and collaboration contribute to improved patient outcomes, streamlined workflow, and increased job satisfaction among nurses [65], particularly in demanding and time-sensitive emergency response situations [66]. Nurses play a crucial role in the healthcare team, and their contributions are closely tied to the establishment of effective communication and efficient cooperation with other healthcare workers [67]. When nurses feel appreciated and their expertise is acknowledged, it fosters a positive and supportive working environment,

which can ultimately lead to better patient care and organization performance. While these factors are commonly emphasized in describing the work environment in hospital settings, they become even more critical during emergency responses, where the traditional up and down hierarchy and status lines may be less emphasized [68]. By fostering a culture of teamwork and collaboration, healthcare organizations can create an environment that values the contributions of each team member and promotes open communication, mutual respect, and effective coordination [69, 70].

The factor of Logistics and Humanistic care within the organizational traits encompasses the provision of both physical and psychosocial support. Previous experiences and views of frontline healthcare workers during past pandemics have underscored the significance of adequate physical support, managing high workloads, handling long shifts, promoting adequate rest and recovery, and fostering positive relationships with the surroundings [71]. In this context, nurses expected additional benefits and spiritual rewards, beyond their regular salaries, as recognition for their dedicated contributions and extraordinary efforts made during these challenging times. Additionally, the demanding nature of frontline work has led nurses to desire adequate vacation time after fulfilling emergency tasks. Consistent with this, a review illustrated that organizations incorporated logistics support for nurses by ensuring the availability of personal protective equipment, adequate food and supplies, and also extending this support to the families of frontline workers to alleviate their concerns and provide a sense of security [72]. In addition to logistics support, emphasizing humanistic care for nurses has become a common practice to enhance their psychological well-being [73]. Nurse leaders who offer emotional support and empathy can significantly impact the overall morale and resilience of the nursing workforce [60, 74]. Empirical evidence from cross-sectional surveys indicates that nurses who perceive higher levels of organizational and social support, and demonstrate resilience, are more likely to report lower levels of anxiety related [75].

4.2. The Validity and Reliability of the C-NEW-PHE. The scale adaptation of the C-NWE was rigorously conducted following Heggstad's practical guideline and within the specific situational context of PHEs. An initial set of items was created based on the experiences of nurse managers in establishing a healthy work environment during the COVID-19 pandemic, taking into account the essential

dimensions derived from previous descriptions of work environments in normal hospital settings, specifically considering the Chinese context [9, 22, 42, 43]. The scale items and construct were identified through collaboration with a research team and several nine-researcher workshops. Moreover, a Delphi expert panel method was employed to ensure content validity, resulting in acceptable I-CVI scores ranging from 0.85 to 1.00 and satisfactory S-CVI/Ave of 0.93, which affirms a strong agreement among experts regarding the relevance of the items and the scale's adequate content validity [76]. To further validate these items, the preliminary survey was conducted with nurses, confirming the suitability of the revised items.

During the development process, the internal consistency reliabilities and factor loadings of the assumed dimensions demonstrated satisfactory results. The scale validation of the C-NWE-PHE was performed by CFA using the SEM method, showing how relationships amongst items in the measure and the dimensions are consistent with the conceptual framework depicting the organizational traits of the work environment. The C-NWE-PHE exhibited a distinct factorial structure compared to both the original C-NWE scale and other existing instruments with varying content [20]. To further validate the scale's structure and model fits, future research should involve testing the C-NWE-PHE in various PHE events and across international healthcare organizations.

4.3. Limitations and Strengths. The generalizability of this study may be limited due to the sampling population, as it represents the first attempt to quantitatively assess workplace characteristics related to PHEs. Furthermore, the data collected from nurses relied on self-report measures, which can introduce response bias or social desirability bias. However, to address this limitation, we included data from nurse managers, validated the measures with experts, and conducted tests using the nurses' data. Additionally, as the primary aim was scale validation, a cross-sectional design was employed, which does not allow for establishing causal relationships between the work environment, nurses' characteristics, and nurses' outcomes. Further research is needed to explore their correlations with the performance of nursing management. It is worth noting that this study possesses several strengths, such as a rigorous scale adaptation process, a large sample size, multicenter data collection, comprehensive analysis, and a significant contribution to the field of nursing work environment during public health emergencies. The findings provide valuable evidence for understanding and assessing the work environment in such contexts, serving as a foundation for future research and improvement strategies in nursing practice.

4.4. Implications for Nursing Management. The theoretical constructs of the C-NWE-PHE scale provide valuable insights into nurses' perceptions of the nursing work environment during the PHEs, demonstrating robust validity and reliability. It can be potentially utilized in

cross-sectional studies, prospective assessments of organizational traits, and interventional research. Future studies should not only concentrate on addressing acute burnout and reducing turnover intentions among nurses but should also prioritize the development and implementation of strategies that foster a healthy working environment conducive to nurses' well-being. To advance our understanding of the different constructs within the work environment and effectively implement improvements, concrete efforts and clear directions are needed for global applicability, including comparative studies across various workplaces to identify successful managerial measures. Further research aiming to pinpoint specific areas of improvement and interventions that target key factors such as workload management, professional development, leadership support, and collaboration can be designed. By considering the dynamic nature of the nursing work environment in PHE settings and understanding its interrelated components, healthcare organizations can better prepare for and respond to emergencies effectively.

5. Conclusions

This study employed a rigorous scale adaptation process that incorporated qualitative data, expert collaboration, and statistical analysis. Through this comprehensive approach, the reliability and validity of the C-NWE-PHE scale for assessing the work environment in the context of PHEs were ensured. Recognizing that the nursing workforce is an indispensable part of the health system and contributes to the resilience of organizations, it is imperative to invest in research and initiatives that foster a positive and supportive work environment for nurses.

Data Availability

The original contributions presented in the study are included in the article, and further inquiries can be directed to the corresponding author/s.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

The Mediating Effect of Nurses' Emotional Intelligence in the Relationship between Moral Sensitivity and Communication Ability with Angry Patients

Si-Yan Guo ¹, Xiao-Kai Wang ¹, Zhen-Xiang Zhang,¹ Qiu-Jun Zhang,² Xue Pan,¹ Cai-Xia Li,³ and Dan-Dan Ke¹

¹School of Nursing and Health, Zhengzhou University, Zhengzhou, Henan, China

²No. 5 Affiliated Hospital of Zhengzhou University, Zhengzhou, Henan, China

³Zhengzhou Central Hospital Affiliated to Zhengzhou University, Zhengzhou, Henan, China

Correspondence should be addressed to Xiao-Kai Wang; wangxiaokai66@zzu.edu.cn

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Aims. To test whether emotional intelligence plays a mediating role in the process by which moral sensitivity affects nurses' ability to communicate with angry patients. **Background.** Hospital workplace violence is a global problem that disrupts the normal work order of healthcare, undermines trust between nurses and patients, and threatens the physical and mental health of nurses. Improving nurses' ability to communicate with angry patients to identify and diffuse patients' anger is critical to reducing the nurse-patient conflict and avoiding violence in the hospital workplace. **Methods.** The data were collected in China. A sample of 212 nurses completed measures of moral sensitivity, emotional intelligence, and the ability to communicate with angry patients. Structural equation modeling was used to test the study's hypothesis. **Results.** Our results suggest that nurses' emotional intelligence mediates the relationship between nurses' moral sensitivity and nurses' ability to communicate with angry patients, with a positive correlation between nurses' moral sensitivity, emotional intelligence, and ability to communicate with angry patients. **Conclusions.** The findings showed that nurses' moral sensitivity indirectly influenced nurses' ability to communicate with angry patients by directly influencing emotional intelligence. This study provides a theoretical and methodological approach to mitigate nurse-patient conflict and reduce violence in the hospital workplace through a moral perspective. **Implications for Nursing Management.** Nursing managers should pay attention to the moral sensitivity and emotional intelligence of nurses and promote their moral development and emotional intelligence by strengthening moral education in hospitals, utilizing emotional intelligence training courses and narrative nursing, ultimately promoting nurses' ability to communicate with angry patients, further contributing to the reduction of nurse-patient conflict, avoiding violence in the hospital workplace, building a safer hospital environment, promoting the overall development of nurses, and contributing to the development of global health and wellness.

1. Introduction

Workplace violence in hospitals continues to be a global problem that disrupts the normal work order of healthcare, undermines trust between nurses and patients, leads to nurses' emotional exhaustion and resignation, and even threatens the lives of nurses [1–3]. Anger, as an innate human emotion, is a precursor to the deterioration of all kinds of interpersonal relationships [4]. The accumulating anger of patients is a direct factor and trigger for eventual

nurse-patient conflict and hospital workplace violence. Therefore, the key to resolving nurse-patient conflict and preventing violence in the hospital workplace lies in timely and accurate identification of patients' anger, understanding the cause of their anger, and effectively communicating with them [5]. Nurses are most closely related to patients and serve as the "outpost" of hospital violence. It has been shown that there is a negative correlation between nurses' communication ability and medical disputes and nurse-patient conflicts [6]. In other words, the higher the communication

ability of nurses, the fewer nurse-patient conflicts, and the lower the likelihood of hospital workplace violence [7]. At the same time, the nurse's emotions as an individual also need to be seen when considering the nurse's communication with an angry patient. Nurses who fail to control their emotions often respond to difficult-to-communicate patients with anger and frustration [8]. But nurses with high emotional intelligence can successfully resolve conflicts and contradictions from angry patients [9–11]. Therefore, it can be seen that not only does the nurse's communication ability play a role, but their level of emotional intelligence also influences the outcome of handling nurse-patient conflicts. Research has also proven that nurses' communication ability is related to moral sensitivity [12]. The higher the nurses' moral sensitivity, the greater the ability to detect patients' problems in the clinical environment, and the better the nurses' communication ability [13]. Thus, this issue cannot be viewed in isolation; when considering nurses' ability to communicate with angry patients, we must comprehensively consider both their moral sensitivity and emotional intelligence. This study takes a moral psychology perspective to explore whether moral sensitivity affects nurses' ability to communicate with angry patients through direct or indirect pathways. The findings of this study will provide nursing managers with new perspectives and approaches to resolving the problem of medical conflicts and hospital workplace violence.

2. Literature Review and Hypotheses

2.1. The Concepts of Moral Sensitivity, Emotional Intelligence, and the Ability to Communicate with Angry Patients. Moral sensitivity is the ability to recognize ethical issues and be aware of the consequences of ethical decisions [14]. Nurses' moral sensitivity is defined as their understanding of patients' vulnerability, their ability to identify potential conflicts, and their capacity to accurately infer patient issues while being aware of the consequences of patient decisions [15]. This enables nurses to make favorable decisions for patients.

Emotional intelligence refers to the ability to recognize, control, and utilize one's own emotions and the emotions of others [16].

The ability to communicate with angry patients refers to nurses' capacity to recognize the patient's anger early, identify the cause of the anger, and diffuse it through effective communication skills [17]. In developing the scale, Chen argued that nurses' ability to communicate with an angry patient encompasses four areas: the nurse's recognition of the patient's anger, exploration of the cause of the patient's anger, the nurse's personal preparedness, and communication skills.

2.2. Studies on Moral Sensitivity and Emotional Intelligence. A strong positive correlation exists between the moral reasoning ability of nurse leaders and their emotional intelligence [18]. Similarly, a study pointed out that emotional intelligence is an important variable in ethical decision-

making [19]. Further research into the moral sensitivity and emotional intelligence of nurses by Kim found a positive correlation between nurses' emotional intelligence and moral sensitivity in a study conducted among Korean nurses [15]. Emotional intelligence and moral sensitivity play crucial roles in influencing nurses' ethical decision-making [20]. Furthermore, higher levels of moral sensitivity, emotional intelligence, and work engagement in nurses contribute to improved interpersonal relationships [21]. Moral sensitivity and emotional intelligence are recognized as key elements influencing interpersonal relationships.

2.3. Studies on Moral Sensitivity and the Ability to Communicate with Angry Patients. The communication of bad information to patients or families poses an ethical challenge, leading to extensive research on moral sensitivity in this context. Studies have demonstrated that nurses' moral sensitivity affects their communication ability with patients and their families [22, 23]. Nurses with high levels of moral sensitivity tend to perform better in delivering adverse events reports to patients and families, engaging in honest and safe communication [24]. A high level of moral sensitivity enables nurses to be more attuned to the physical and psychological conditions of patients and actively seek verbal or nonverbal approaches to problem-solving [25].

2.4. Studies on Emotional Intelligence and the Ability to Communicate with Angry Patients. Emotional intelligence is recognized as a vital foundation of nurses' conflict resolution abilities. Studies have demonstrated that emotional intelligence as one important component of nurses' personality traits can predict various coping strategies for dealing with conflict [9, 26]. Moreover, emotional intelligence significantly impacts the frequency of workplace violence experienced by nurses. Research has also revealed that emotional intelligence catalyzes improved communication, effectively addressing workplace violence through enhanced communication skills [10]. Emotional intelligence influences nurses' communication style and determines the quality of patient-nurse interactions. Consequently, researchers recommend enhancing the level of emotional intelligence among nurses to improve the quality and safety of patient care [27].

2.5. Conceptual Model. This study utilized the social cognitive theory to establish a conceptual model that examines the relationship between nurses' moral sensitivity, emotional intelligence, and their ability to communicate with angry patients [28]. According to the social cognitive theory, individuals learn and develop their behaviors through continuous interactions between personal factors, environmental factors, and behavioral factors. In this study, nurses' moral sensitivity and emotional intelligence are considered as personal factors, the mood of angry patients as an environmental factor, and nurse-patient communication ability is considered as a behavioral factor. Based on the conceptual model, the following hypotheses were proposed:

- (1) There is a correlation between nurses' moral sensitivity, emotional intelligence, and ability to communicate with angry patients.
- (2) Nurses' moral sensitivity can directly and positively influence nurses' emotional intelligence.
- (3) Nurses' moral sensitivity can directly and positively influence nurses' ability to communicate with angry patients.
- (4) Nurses' emotional intelligence can directly and positively influence nurses' ability to communicate with angry patients.
- (5) Nurses' moral sensitivity can indirectly influence nurses' ability to communicate with angry patients by affecting nurses' emotional intelligence.

3. Methods

3.1. Aims. This study aimed to describe the levels of moral sensitivity, emotional intelligence, and communication ability with angry patients among nurses, and to test whether emotional intelligence plays a mediating role in the process by which moral sensitivity affects nurses' ability to communicate with angry patients.

3.2. Design. This study used a cross-sectional research design and correlation analyses to examine the mediating role of emotional intelligence in the relationship between moral sensitivity and nurses' ability to communicate with angry patients. To determine the relationship between these variables, responses from participants were gathered through an online survey. The language used in the questionnaire was Chinese.

3.3. Participants. Nurses who participated met the following inclusion criteria: (a) having worked for one year and above in the current hospital; and (b) willing to participate in the study. The minimum sample size for structural equation modeling (SEM) is 200 [29]. According to the statistician's recommendations, 5 to 10 times the maximum number of items in the study scale was calculated to determine the sample size in this range [30, 31]. Using the Monte Carlo method [32] based on simulation techniques, it was determined that the minimum sample size required to achieve the desired level of statistical power (80%) was 90 cases. In this study, we recruited 212 participants. The statistical power level for the sample size of 212 cases obtained in this study was 91%. Exclusion criteria were those who did not complete the scale and selected the same answer for all of them, and those who were away from clinical work for more than three months for various reasons before the start of the study. Nurses participating in the study were drawn from a tertiary public hospital in Zhengzhou, Henan Province, China, using a systematic sampling method.

3.4. Variable Measurements

3.4.1. Moral Sensitivity. The Moral Sensitivity Questionnaire was developed by Lützné and revised in 2006 [33]. It was translated and culturally adapted by Huang to make the MSQ-R more appropriate for Chinese nurses [34]. The Chinese version of the MSQ-R consists of two dimensions, Moral Burden (4 items) and Moral Responsibility (5 items), and is scored on a 6-point Likert-type scale ranging from 1 "totally disagree" to 6 "totally agree." Scores range from 9 to 54, with higher scores indicating higher levels of moral sensitivity, with a total score of <32 indicating low sensitivity, 32–43 indicating moderate sensitivity, and >43 indicating high sensitivity. The Cronbach's α of this scale in this study is 0.896.

3.4.2. Emotional Intelligence. The Emotional Intelligence Scale was developed in 2002 [35]. In 2010, Wang translated the scale into Chinese and administered it to university students, civil servants, and corporate employees using the Chinese version. The scale consists of four dimensions: Self-Emotional Assessment (4 items), Emotional Assessment of Others (4 items), Emotional Control (4 items), and Emotional Application (4 items). Using a 7-point Likert scale (1 = "I totally disagree" to 7 = "I totally agree"), the scale scores range from 7 to 112, with higher scores indicating higher emotional intelligence. The Cronbach's α of this scale in this study is 0.964.

3.4.3. Nurse's Communication Ability with Angry Patients Scale (NCAAPS). Developed by Chen in 2021 in China, the NCAAPS consists of 4 dimensions: anger perception (3 items), cause exploration (6 items), self-preparation (7 items), and communication skills (3 items) [17]. The options were assigned from "Strongly Disagree" to "Strongly Agree" on a scale of 1–5, with higher scores indicating better communication skills in angry situations, with a maximum score of 95. The Cronbach's α of this scale in this study is 0.934.

3.5. Data Analysis. The data was analysed using SPSS and AMOS software. First, SPSS was used to filter and remove invalid questionnaires. The total number of participants who chose the same answers for all questions was five, and the total number of participants who did not fill in some of the answers was three. These invalid questionnaires were removed as recommended by existing studies [36]. Descriptive statistics were used to describe general characteristics. Relationships between all dimensions were assessed by Pearson correlation analysis. Validating factor analysis was used to test the applicability of the AMOS measurement model, followed by structural equation modeling to verify the relationship between moral sensitivity, emotional intelligence, and nurses' ability to communicate with angry patients. The mediating role of emotional intelligence was also tested.

3.6. *Ethical Considerations.* Before the investigation, the study was approved by the university ethics committee (approval number: 2023-109) and by the hospital nursing department. Nurses volunteered to participate in this study and could quit at any time. The electronic questionnaire was completed anonymously.

4. Results

4.1. *Participants' Sociodemographic Characteristics.* The demographic characteristics of the participants are shown in Table 1. The majority of participants were female (69.3%) and married (80.2%). The mean age of the participants was 35.35 years (SD = 7.51) and the mean number of years worked was 14.82 years (SD = 9.26). The general information characteristics of the sample drawn were generally consistent with those of previously studied Chinese nurses [37].

4.2. *Moral Sensitivity, Emotional Intelligence, and Nurses' Ability to Communicate with Angry Patients and the Association between the Variables.* Descriptive statistics for the key variables are shown in Table 2, with a total mean score of 46.62 (SD = 7.55) for moral sensitivity, 92.92 (SD = 15.42) for emotional intelligence, and 81.64 (SD = 11.62) for the nurses' ability to communicate with angry patients. As shown in the correlation matrix in Table 2, moral sensitivity was significantly positively correlated with emotional intelligence ($r = 0.544$, $p < 0.001$) and also with nurses' ability to communicate with angry patients ($r = 0.734$, $p < 0.001$). The nurses' emotional intelligence was also significantly positively correlated with nurses' ability to communicate with angry patients ($r = 0.627$, $p < 0.001$).

4.3. *Structural Equation Model.* Using moral sensitivity as the independent variable, the nurses' ability to communicate with angry patients as the dependent variable, and emotional intelligence as the mediating variable, a structural equation model plot was created using AMOS. The model fit indices $X^2/df = 2.125 (< 3)$, RMSEA = 0.06 (< 0.08), CFI = 0.986 (> 0.9), IFI = 0.986 (> 0.9), GFI = 0.943 (> 0.9), and TLI = 0.981 (> 0.9), were all within acceptable limits, indicating that the structural model fitted well (Figure 1).

4.4. *The Mediating Effect Analysis.* As shown in Table 3, moral sensitivity has a direct positive effect on both emotional intelligence ($\beta = 0.61$, $p < 0.001$) and the nurse's ability to communicate with angry patients ($\beta = 0.69$, $p < 0.001$). Emotional intelligence directly and positively influenced nurses' ability to communicate with angry patients ($\beta = 0.25$, $p < 0.001$). Moral sensitivity also positively influences nurses' communication skills with angry patients indirectly through emotional intelligence ($\beta = 0.15$, $p < 0.001$). The findings suggest that nurses' moral sensitivity indirectly affects nurses' ability to communicate with angry patients by directly influencing nurses' emotional intelligence.

Emotional intelligence played a mediating role in the influence of moral sensitivity on nurses' ability to communicate with angry patients.

5. Discussion

Social cognitive theory suggests that human activity is determined by the interaction of three factors: the external environment in which the individual lives, individual cognition and other individual characteristics, and individual behavior [28]. When a person is placed in an environment, not only does the environment have an impact on the individual's behavior, but the individual's cognition and individual characteristics also play a significant role in the individual's behavior. Based on the background of social cognitive theory, this study aims to examine and clarify the relationship between nurses' moral sensitivity, emotional intelligence, and their ability to communicate with angry patients. Additionally, it seeks to explore the mechanisms through which nurses' moral sensitivity influences their ability to communicate with angry patients. The main finding of this study highlights the significant mediating role of nurses' emotional intelligence between their moral sensitivity and their ability to communicate with angry patients. Moreover, a strong positive correlation is observed between nurses' emotional intelligence and their moral sensitivity. These findings are consistent with hypotheses based on social cognitive theory.

5.1. Moral Sensitivity Influences Nurses' Ability to Communicate with Angry Patients through the Mediating Role of Emotional Intelligence

5.1.1. *Moral Sensitivity Directly Affects Nurses' Ability to Communicate with Angry Patients.* This study discovered a significant positive correlation between nurses' moral sensitivity and their ability to communicate with angry patients. The findings of this study indicate that higher levels of moral sensitivity in nurses are associated with better communication abilities when interacting with angry patients and a reduced likelihood of nurse-patient conflict. These findings align with previous studies that have also highlighted the relationship between nurses' communication abilities and moral sensitivity [26, 38].

This study further revealed that nurses with a heightened awareness of their moral responsibility exhibited better assessment of the emotional state of angry patients, their own emotions, emotional preparedness, and emotional control (Table 2). Additionally, nurses with high levels of moral sensitivity demonstrated increased sensitivity to potential nurse-patient conflicts in clinical settings, enabling them to detect the accumulation of anger in patients more effectively and promptly (Table 2). Furthermore, nurses with high moral sensitivity displayed a greater awareness of their moral responsibilities and burdens, leading them to proactively address communication issues with angry patients (Table 2).

TABLE 1: Sociodemographic characteristics of participants ($n = 212$).

Nurse characteristics	Mean (SD)	N (%)
Gender		
Male		65 (30.7)
Female		147 (69.3)
Age	35.35 (7.51)	
20~30		62 (29.2)
31~40		81 (38.2)
>40		69 (32.6)
Years in nursing	14.82 (9.26)	
1~5		47 (22.2)
6~10		47 (22.2)
11~20		64 (30.2)
>20		54 (25.4)
Professional title		
Junior		94 (44.3)
Intermediate		87 (41.1)
Senior		31 (14.6)
Education level		
Secondary vocational		18 (8.5)
Associate degree		57 (26.9)
Bachelor's degree		126 (59.4)
Master's degree or above		11 (5.2)
Marital status		
Married		170 (80.2)
Single		39 (18.4)
Other (divorce/widowed)		3 (1.4)

5.1.2. Emotional Intelligence Mediates the Relationship between Moral Sensitivity and the Nurses' Ability to Communicate with Angry Patients. We can find that from this study, moral sensitivity has a positive impact on nurses' ability to communicate with angry patients, and emotional intelligence plays a mediating role between these two factors; nurses' moral sensitivity indirectly influences their ability to communicate with angry patients by directly influencing their emotional intelligence.

Nurses with high moral sensitivity are adept at identifying moral issues by gathering information from their environment. When they become aware of ethical dilemmas, their emotional intelligence is activated, allowing them to integrate their own emotions with those of others, ultimately leading to problem-solving behaviors. Moral sensitivity provides cognitive material and cues, while emotional intelligence integrates them. Through the use of emotional intelligence, nurses can identify patients' anger and mobilize their emotional intelligence to explore the underlying causes, evoke positive emotions within themselves, and employ effective communication skills to defuse the patients' anger. In this way, nurses' emotional intelligence serves as a bridge between moral sensitivity and their ability to communicate with angry patients.

5.2. Practical Implications

5.2.1. Promotions of Nurses' Moral Sensitivity. Reflecting on existing research, the overarching goal of studies on nurse ethics and nurse ethics education is to foster nurses' moral

consciousness. This aims to ensure that nurses adhere to ethical principles in clinical practice and make decisions that maximize patient benefits in complex healthcare scenarios. The cultivation of nurses' moral sensitivity is crucial in this regard.

To enhance nurses' moral sensitivity, managers can establish a moral education platform for nurses through interdisciplinary collaboration, including integration with humanities and social science disciplines. This integration serves to promote nurses' moral sensitivity and incorporate it into their professional practice. A panel consisting of nursing researchers, humanities and social science researchers, and other relevant stakeholders can be convened to determine the course content based on existing literature on moral sensitivity in nursing and theoretical models of moral sensitivity.

The course can be structured in two phases. In the first phase, nurses receive lectures on the theoretical aspects of the moral sensitivity course. The second phase adopts a discussion and questioning approach, encouraging nurses to raise questions and engage in moral discussions regarding potential issues that may arise in clinical settings. This interactive approach encourages nurses to actively explore and analyse moral dilemmas, thereby further developing their moral sensitivity [39]. Kant, in his work "On Pedagogy," emphasizes that the ultimate goal of education is to enable individuals to transition from "heteronomy" to "self-discipline" [40, 41]. In other words, the ideal moral development of nurses entails the transformation of external moral constraints into internal moral principles. Successful

TABLE 2: Statistical description and correlation matrix results for study variables ($n = 212$).

	M (SD)	Cronbach' α	MR	MB	MS	AP	CE	SP	CS	NCAAP	EC	EA	SA	EAO	EI
MR	5.36 (0.88)		1												
MB	4.94 (0.98)	0.972	0.699**	1											
MS	4.662 (7.55)		0.919**	0.923**	1										
AP	4.29 (0.66)		0.614**	0.543**	0.628**	1									
CE	4.25 (0.69)		0.692**	0.661**	0.730**	0.787**	1								
SP	4.3 (0.66)	0.975	0.633**	0.564**	0.646**	0.732**	0.840**	1							
CS	4.34 (0.67)		0.617**	0.598**	0.656**	0.693**	0.799**	0.833**	1						
NCAAP	81.64 (11.62)		0.703**	0.655**	0.734**	0.865**	0.942**	0.940**	0.903**	1					
EC	5.75 (1.06)		0.473**	0.454**	0.502**	0.494**	0.601**	0.583**	0.499**	0.601**	1				
EA	5.8 (0.98)		0.482**	0.497**	0.530	0.503**	0.586**	0.520**	0.474**	0.574**	0.859**	1			
SA	5.88 (0.95)	0.968	0.451**	0.473**	0.502**	0.488**	0.582**	0.571**	0.527**	0.597**	0.856**	0.821**	1		
EAO	5.8 (0.97)		0.482**	0.488**	0.527**	0.510**	0.608**	0.561**	0.507**	0.602**	0.870**	0.896**	0.870**	1	
EI	92.92 (15.42)		0.498**	0.504**	0.544**	0.527**	0.628**	0.590**	0.530**	0.627**	0.949**	0.943**	0.936**	0.959**	1

r: Pearson coefficient; ** Statistically significant at $p < 0.001$; MR: moral responsibility; MB: moral burden; MS: moral sensitivity; EC: emotional control; EA: emotional application; SA: self-emotional assessment; EAO: emotional assessment of others; EI: emotional intelligence; AP: anger perception; CE: cause exploration; SP: self-preparation; CS: communication skills; NCAAP: nurse's communication ability with angry patients.

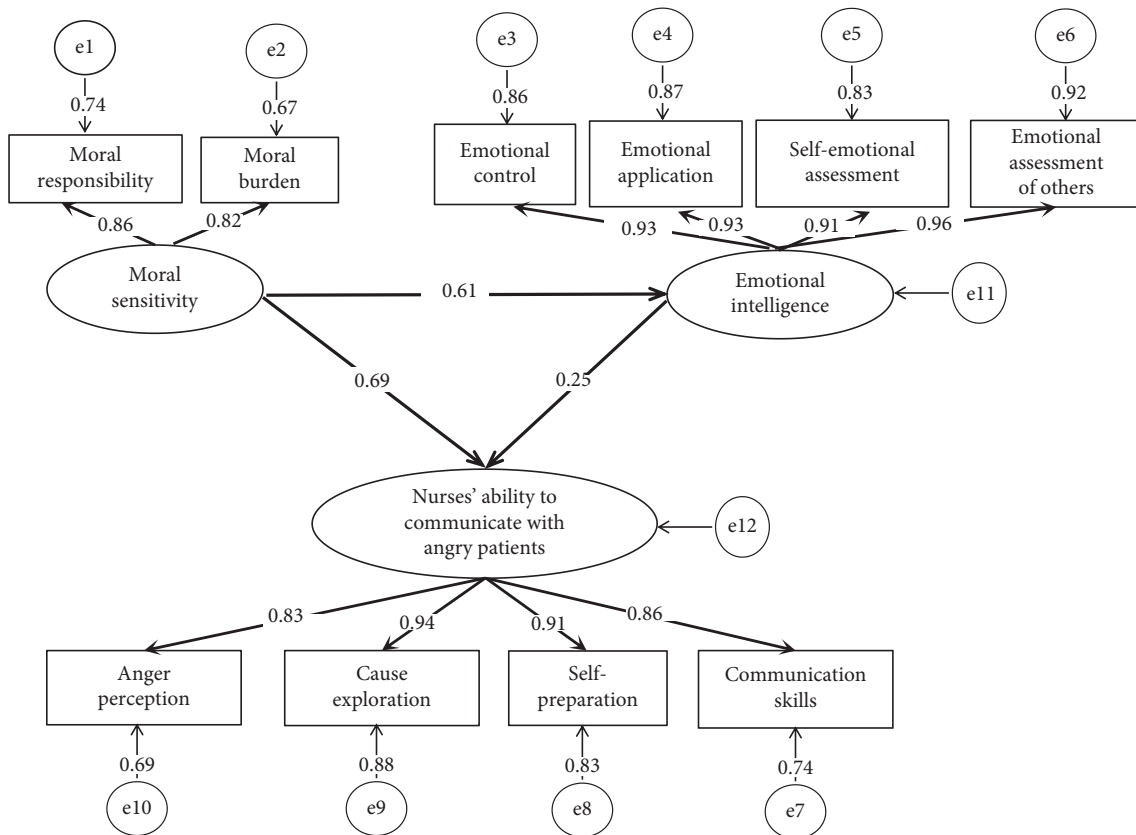


FIGURE 1: Standardized coefficients for path analysis of direct and indirect effects of moral sensitivity on the ability of nurses to communicate with angry patients mediated by nurses' emotional intelligence.

TABLE 3: Mediating effect.

	β	95%CI		<i>p</i>
Direct effect of MS on NCAAP	0.69	0.50	0.84	<0.001
Effect of MS on EI	0.61	0.45	0.73	<0.001
Effect of EI on NCAAP	0.25	0.09	0.43	<0.001
Indirect effect	0.15	0.05	0.28	<0.001
Total effects	0.84	0.74	0.91	<0.001

MS: moral sensitivity; EI: emotional intelligence; NCAAP: Nurse's Communication Ability with Angry Patients.

moral education for nurses empowers them to transcend their previous moral selves and attain a higher level of moral sensitivity. In complex clinical settings, nurses can utilize their moral sensitivity to identify potential patient issues and engage in altruistic behavior instinctively. This is because nurses have internalized morality, enabling them to act based on self-discipline rather than external constraints.

5.2.2. Improvements of Nurses' Emotional Intelligence. Nursing managers should indeed prioritize the development of nurses' emotional intelligence, as nurses with poor emotional regulation may struggle with complex moral choices and experience heightened negative emotions in the face of ongoing moral stress. To address this, training courses on emotional intelligence can be conducted to provide nurses with education on emotional recognition, emotional control, and communication skills. These courses

should aim to enhance nurses' understanding of emotional intelligence by explaining its theories and theoretical models.

The course also can be designed to improve nurses' emotional intelligence through interactive activities such as self-reporting, role-playing, and group debriefing. Nurses can be randomly divided into small groups and assigned various clinical cases for discussion. Each group can then use a PowerPoint presentation to analyse the emotional aspects of the case, including the emotions of both the nurse and the patient, identify any inappropriate emotional responses from the nurse, and suggest measures to address the case. Incorporating emotional intelligence assessment into the evaluation criteria for nurses' abilities and performance is also recommended.

Furthermore, nursing managers can consider utilizing narrative medicine and narrative care to enhance nurses' emotional intelligence. These approaches involve utilizing

storytelling and reflective practices to promote self-awareness and empathy, thereby improving emotional intelligence. Establishing relevant departments within hospitals to provide support and assistance in enhancing nurses' emotional intelligence can further contribute to their development in this area.

5.2.3. Training on Nurses' Ability to Communicate with Angry Patients, Reduce the Occurrence of Workplace Violence. To train nurses on communicating emotions with angry patients, firstly, nurses must learn to identify patients' anger in a timely and accurate manner. They can improve their ability to identify patients' anger by reading relevant books, pictures and videos, and sharing good communicational cases. Nursing managers can also incorporate existing research, such as psychological sociology, to develop models of patients' anger changes and set up relevant training and courses in hospitals to improve nurses' ability to communicate with angry patients.

6. Limitations

This study explored the relationship between nurses' moral sensitivity, emotional intelligence, and ability to communicate with angry patients. However, this study sampled some nurses in China and the findings may not be completely representative of other countries. Future researchers will need to further expand the sample participants for the study. Additional variables could be considered for future studies to explore the role that other variables play in the relationship between nurses' moral sensitivity, emotional intelligence, and ability to communicate with angry patients.

7. Conclusions

This study aimed to explore the relationship between nurses' moral sensitivity, emotional intelligence, and ability to communicate with angry patients. The findings showed that there was a positive relationship between nurses' moral sensitivity, emotional intelligence, and ability to communicate with angry patients, and that emotional intelligence mediated the relationship between moral sensitivity and ability to communicate with angry patients. Nurses' moral sensitivity indirectly influenced nurses' ability to communicate with angry patients by directly influencing emotional intelligence. This study provides new perspectives and methods for alleviating nurse-patient conflict and resolving hospital violence [42].

Data Availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

In this study, GSY and W XK made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; ZZ X Involved in drafting the manuscript or revising it critically for important intellectual content; ZQJ and PX gave final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. LCX and KDD agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Research Article

Mediating Effects of Perceived Social Support on the Relationship between Comfort and Hope in Hospitalized Patients with Acute Ischemic Stroke

Yueyue He ^{1,2}, Rui Wang,^{1,2} Linqi Mo,^{1,2} and Ling Feng ^{1,2}

¹Department of Neurology, West China Hospital, Sichuan University, Chengdu, China

²West China School of Nursing, Sichuan University, Chengdu, China

Correspondence should be addressed to Ling Feng; fengling216@163.com

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Background. The relationship among comfort, perceived social support, and hope should still be further explored. Clarifying the relationship between the aforementioned variables can enable clinical staff to implement tailored and effective intervention strategies for enhancing the management and quality of care of patients with ischemic stroke. **Aim.** This study aims to investigate the relationship between comfort, perceived social support, and hope in hospitalized patients with acute ischemic stroke and to explore the mediating effect of perceived social support on comfort and hope. **Methods.** A correlational cross-sectional study was performed using an online questionnaire. The study was conducted from January to August 2023 among 572 patients with acute ischemic stroke, and finally 534 valid questionnaires were included in the analysis. The general information questionnaire, Modified Barthel Index, Shortened General Comfort Questionnaire, Perceived Social Support Scale, and Herth Hope Index were utilized for investigation. Mediation analysis was performed by structural equation modelling. Indirect effects were evaluated through bootstrapping. Data analysis was performed using the statistical program packages, namely, SPSS 29.0 and AMOS 24.0. **Results.** The comfort, perceived social support, and hope scores of patients with acute ischemic stroke were 94.1 (11.92), 72.74 (10.26), and 40.55 (4.99), respectively. The participants' hope was positively related to comfort ($r = 0.531$, $p < 0.001$) and perceived social support ($r = 0.589$, $p < 0.001$). Perceived social support exerts a partial mediating role between comfort and hope, and the mediating effect was 0.159 (95% CI [0.117, 0.210]), accounting for 25.0% of the total effect. **Conclusion.** We reported that comfort—directly and indirectly—exerts a positive impact on hope. Particularly, perceived social support enhances the impact of comfort on hope; perceived social support mediates the relationship between comfort and hope. Clinical staff should correctly understand the relationship among the three variables; they should effects targeted strategies to enhance patient comfort and social support, thereby increasing the hope level among ischemic stroke patients and bolstering confidence in disease management. **Implications for Nursing Management.** This study demonstrates that comfort and perceived social support serve as protective factors for hope among ischemic stroke patients. This observation provides evidence supporting the optimization of management for ischemic stroke patients from the perspectives of the cognitive adaptation theory and comfort theory. The findings of this study contribute to a more optimal understanding among clinical caregivers regarding the mechanisms underlying the relationship between comfort, social support, and hope, and it facilitates the adoption of effective intervention strategies for promoting the psychological management of ischemic stroke patients and enhancing patient care quality.

1. Introduction

Stroke is the second leading cause of death and the third leading cause of disability worldwide, and exhibits high morbidity, disability, and mortality [1]. There are more than

2 million new cases of stroke in China every year, and stroke is the first leading cause of death and disability in adults [2]. Acute ischemic stroke (AIS) accounts for 60% to 80% of all strokes [3]. Stroke often exhibits an acute onset and rapid progression [4]. Due to its severity, unpredictability, and

uncontrollability, patients become prone to neurological dysfunction, hemiplegia, anxiety and depression, and other physical and mental symptoms [5, 6]. They exhibit increased negative emotions and negative attitudes toward the disease and a crucially reduced hope level [7]. Patients require comfort to alleviate the psychological distress occasioned by these symptoms, as well as hope to treat the illness [8]. Hope can enable patients to rebuild personal confidence and can make patients believe that a positive, realistic, and expected life goal can be achieved [9]. As an internal strength of psychology, it can enable patients to overcome difficulties, relieve pain, and enhance confidence in overcoming the disease. The recovery of self-care ability in patients with acute ischemic stroke is a lengthy process that requires patients to be full of hope and to accept their condition and exhibit active psychological recovery to obtain more optimal results [10]. However, patients hope is influenced by many aspects, such as occupation, education level, and psychological status [11, 12]. The crucial factor is the patient's feeling about the disease (i.e., comfort and perceived social support), which is the source and motivation of hope [7, 13].

Comfort is a pleasant experience, a desired state of satisfaction, and a feeling of positivity and strength in one's ability to cope with crisis and challenge [14]. Enhanced comfort after therapeutic interventions may increase hope and confidence and facilitate healing [15]. Long-term cognitive comfort indicates that life is not dynamic, which can easily lead to cognitive habits, thereby creating a scenario in which individuals fall into cognitive comfort zones and, thus, lose interest in life [16]. Patients with acute ischemic stroke often exhibit emotional, concentration, and fatigue problems, which generally transition from a state of cognitive stress to a state of cognitive relaxation and may fall into a cognitive comfort zone [17]. How to enable them to make decisions that can facilitate life- and cognitive environment-related changes is a novel experience and challenge for the mechanism of patients with acute ischemic stroke. Kolcaba defines comfort as "The immediate experience of being strengthened by having needs for relief, ease, and transcendence met in four contexts: physical, psychospiritual, sociocultural, and environmental, and it is so much more than the absence of pain" [18]. The patient relieved physical, psychological, and environmental discomfort; achieved spiritual comfort; and was treated as an individual with feelings, thoughts, values, and dignity [19]. Thus, comfort can promote patients with acute ischemic stroke to be able to express their emotions, identify the meaning and value of life, build confidence in the treatment of disease, and establish hope for survival and the future [20].

We examine perceived social support in the context of the transition to building hope, utilizing cognitive adaptation theory as a framework for conceptualizing resilience [21]. Social support enables individuals to feel loved, valued, and respected and includes family, friends, and other social supports [22]. It can also help individuals aspire to health, rebuild trust with others, and begin to integrate into social groups [23]. Optimal social support can provide individuals with trust to relieve stress, prevent anxiety, induce strength, and motivation in others to persevere and enhance personal

hope and confidence in the future. In addition, studies have confirmed that there is a positive correlation between the comfort and hope felt by patients [24]. However, the relationship among comfort, perceived social support, and hope and their functional paths are unclear and should be further explored. From the perspective of the development of the positive psychology of hope, this study explores the influence path and structural causal relationship of comfort and perceived social support on the level of hope. Thus, it provides an entry point of psychological intervention for patients to actively participate in disease rehabilitation after increasing their hope and treatment confidence.

2. Methods

2.1. Study Design. This was a cross-sectional study and inferential analysis from West China Hospital, Sichuan University in Chengdu, Sichuan Province, China. This descriptive correlation study was designed to examine the relationship among comfort, perceived social support, and hope in hospitalized patients with acute ischemic stroke. A convenience sample was utilized to select patients from January to August 2023.

The sample size calculation method intended for this study was based on a total of 52 items across three scales, with the sample size being 10–15 times the total number of items [25, 26]. Considering potential incomplete data collection from patients, we increased the sample size by 10%, leading to a final calculated sample size of 572 cases. Questionnaires were distributed to a total of 572 patients who participated in this study, and surveys with invalid data and missing data were eliminated. Thirteen individuals who provided incomplete responses and 25 individuals who completed poor-quality questionnaires were excluded. Finally, a total of 534 valid questionnaires were included in the analysis, with an effective recovery rate of 93.4%.

2.2. Inclusion and Exclusion Criteria. The inclusion criteria were as follows: (1) age over 18 years; (2) AIS diagnosis made by neurologists and confirmed using computed tomography (CT) or magnetic resonance imaging (MRI); (3) consciousness and cognition were normal; and (4) patients could provide consent and were willing to cooperate with questionnaire completion.

The exclusion criteria were as follows: (1) incomplete clinical data; (2) previous history of other central nervous system diseases; (3) severe cardiac dysfunction, pulmonary dysfunction, liver dysfunction, or renal dysfunction; (4) acute embolism of the external cerebral artery; and (5) pregnancy.

2.3. Instruments

- (1) General information questionnaire. The general information questionnaire was utilized to collect demographic information: gender, age, level of education, marital status, provider payments, and comorbidity.

- (2) Shortened General Comfort Questionnaire (GCQ) [27]. This Likert 6 self-rating scale has 28 items; transcendence is addressed in four domains, namely, physical, psychospiritual, sociocultural, and environmental; and higher scores indicate better comfort. Examples of items relating to the four domains include, "I have a poor appetite" (physical), "My beliefs give me peace of mind" (psychospiritual), "My friends remember me with their cards and phone calls" (sociocultural), and "These surroundings are pleasant" (environmental). Negatively worded items are reverse scored. The GCQ exhibited a Cronbach's α of 0.88. The Chinese version exhibited reliability, with a Cronbach's α of 0.892 [28].
- (3) Perceived Social Support Scale (PSSS) [29]. The scale consists of support from family and friends and has 12 items; each item was scored on a 7-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree), with a higher total score indicating a higher level of social support. The Chinese PSSS has been utilized among Chinese patients and has exhibited satisfactory reliability. Cronbach's α of the scale was calculated to be 0.962 [29].
- (4) Herth Hope Index (HHI) [9]. The scale is a 12-item summated rating scale designed as an individual measure of hope. Participants are asked to rate each item using a 4-point Likert response format. The internal consistency of the HHI in ill adults has been acceptable [30]. Cronbach's α coefficients for total HHI scores were 0.84 for stroke survivors [10].

2.4. Data Collection. The questionnaire was uploaded to the Questionnaire Star platform, an online crowdsourcing platform, and the survey was, subsequently, conducted through the WeChat app. The purpose and significance of the investigation were fully explained to the patients by the investigators. The survey was completed only after signing the informed consent form. Otherwise, they could not complete the questionnaire. The completed scales were immediately collected and initially reviewed by the investigator. If any omission was identified, the questionnaire was to be completed on the spot and checked again. Data were treated as invalid if subjects suddenly felt discomfort, leading them to not complete all questions. Incomplete and semifinished questionnaire data were eliminated and recorded and finally reviewed by two researchers for accuracy.

2.5. Ethical Considerations. The authors confirm adherence to ethical guidelines and obtained ethical approval (from the institutional review board). This study was performed in accordance with the ethical principles of the 1964 Declaration of Helsinki and it was approved by the Ethics Committee of West China Hospital, Sichuan University (No: 2022[1969]).

2.6. Statistical Analysis. Data analysis was conducted using the statistical program packages SPSS 29.0 and AMOS 24.0. In the descriptive statistics, the mean, standard deviation, frequency, and percentage were reported. Pearson correlation was utilized to analyze the correlation between variables. AMOS24.0 established a structural equation model (SEM) of the mediating role of perceived social support between comfort and hope. Comfort and perceived social support are the independent variables, and hope is the result variable. Moreover, subscale scores are utilized as the indicators for the latent factor. The maximum likelihood estimation method was utilized to estimate the model parameters, and the nonparametric percentile bootstrap method of bias correction was utilized to calculate the confidence interval of the effect. Bootstrapping was utilized to verify the mediation effect, with a duplicate sample size of 2000. If the 95% CI (confidence interval) of the indirect effect did not include zero, the mediation effect was proved to be significant [31]. We adopted many common indexes to evaluate the model in the current study, including the chi-square ratio to degrees of freedom (χ^2/df), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), normed fit index (NFI), incremental fit index (IFI), Tucker-Lewis index (TLI), and comparative fit index (CFI). If a model is acceptable, the χ^2/df should be less than 5, and other indexes should be greater than 0.90 [32]. A p value <0.05 was considered to be statistically significant.

3. Results

The mean age of the sample was 62.15 ± 15.03 years, including 369 males. The general characteristics of the patients are depicted in Table 1.

Correlation analysis was performed to verify the relationship between comfort, perceived social support, and hope. Consequently, as illustrated in Table 2, there were bivariate correlations between the subfactors of the main variables. The participants' hope was positively related to comfort ($r=0.531$, $p<0.001$) and perceived social support ($r=0.589$, $p<0.001$). The participants' perceived social support was also positively related to comfort ($r=0.383$, $p<0.001$). All relevant subcategories were positively associated with one another. In addition, most of the coefficients were below 0.80 (i.e., the standard for multicollinearity), indicating that there is no apparent multicollinearity problem [33].

To further explore the effects of comfort and perceived social support on Hope in patients with acute ischemic stroke, we tested for the mediating effects of perceived social support on comfort and hope. According to the research conducted by Wen and Fan [34], we tested this mediating model and constructed the structural equation model (SEM) using AMOS software. We modified the model by adding residual correlation according to the significant results of the initial model parameters and the model correction index provided by AMOS [35]. Herein, 3 model revisions were performed. The results of the SEM analysis indicated that this model was acceptable, $\chi^2/df = 1.722$, RMSEA = 0.037

TABLE 1: General characteristics ($N = 534$).

Variable	Category	<i>n</i> (%)
Gender	Male	369 (69.1)
	Female	165 (30.9)
Level of education	Primary school or below	163 (30.5)
	Junior	128 (24.0)
	Senior	101 (18.9)
	College degree or above	142 (26.6)
Marital status	Unmarried	18 (3.4)
	Married	469 (87.8)
	Widowed or divorced	47 (8.8)
Provider payments	Medical insurance	493 (92.3)
	Self-paying medical	41 (7.7)
Comorbidity	Hypertension	335 (62.7)
	Diabetes mellitus	179 (33.6)
	Hyperlipidemia	64 (12.0)
	Heart disease	146 (27.3)
	Atherosclerosis	156 (29.2)

(95% *CI*: 0.020, 0.052), *GFI* = 0.978, *NFI* = 0.984, *IFI* = 0.993, *TLI* = 0.991, *CFI* = 0.993. The final structural equation model was depicted in Figure 1.

The mediation effect was tested using the bootstrap method with bootstrap samples of 2,000 (Table 3). The results indicated that the bootstrap 95% confidence intervals of the direct and indirect effects of comfort on hope did not contain 0. This observation indicated that perceived social support exerts a partial mediating role between comfort and Hope, and the mediating effect was 0.159 (95% *CI* [0.117, 0.210]), accounting for 25.0% of the total effect.

4. Discussion

Due to the characteristics of a high recurrence rate and high disability rate of stroke, most patients worry or even fear the future prognosis of the disease when treating it [36]. This study revealed that the score of hope in patients with acute ischemic stroke was 40.55 (4.99), which was slightly higher than that of 37.7 (4.46) in previous studies [10], which may be rationalized as follows: with the continuous progress of medical technology in recent years, an increasing number of treatment options have emerged, and the treatment effect of acute ischemic stroke may now be considerably enhanced compared with previous eras. This study mainly included hospitalized patients who were conscious, stable, and able to cooperate with the questionnaire, and most of these patients exhibited more optimal treatment outcomes than those with severe diseases. This observation indicates that we should consider the physical symptoms and signs in the acute stage, create a favorable communication environment and health education, and offer patients care and emotional support. Medical practitioners should, in turn, eliminate their negative emotions, help patients with a more positive and healthy mentality cope with the troubles occasioned by the disease, and promote the enhancement of the hope level in stroke patients.

The results of this study indicate that the comfort of patients with acute ischemic stroke is positively correlated with hope. Herein, the subjects are ischemic stroke patients,

who are primarily elderly males. They generally exhibit a lower overall level of education, and more than half of these patients have one or more accompanying chronic illnesses. These patients face physiological, psychological, and environmental challenges amid the symptoms of the disease and emotional distress [37, 38]. The results of this study indicate that comfort serves as both a preceding variable and a critical intervention variable, aligning broadly with previous research outcomes [39, 40]. Changes in comfort levels impact patients' confidence in disease treatment and their expectations for future life [41]. More comfort and encouragement from healthcare professionals can assist patients in alleviating emotions and in prompting them to step out of their comfort zones [41]; thus, patients can face the challenges posed by the disease with a more positive attitude, which is beneficial for altering cognitive states, aiding in physical and mental recovery, and ultimately increasing hope for rehabilitation. This indicates that the effect of symptom relief is more prominent by evaluating the comprehensive state of patients and, subsequently, formulating and implementing various discomfort relief measures according to the needs and state of patients [42]. The relief of symptoms contributes to the relief of negative emotions and the improvement of the quality of life [43]. In this process, the patient's recovery confidence also increases, which can be reflected in the improvement of the hope level.

Perceived social support reflects the individual's emotional experience and satisfaction, accompanied by a feeling of being respected and supported in society, which is closely related to the individual's subjective feelings [44]. The results of this study revealed that perceived social support can significantly positively predict the level of hope, thereby indicating that higher levels of perceived social support are associated with higher levels of hope. Patients with higher perceived social support were more likely to establish favorable relationships with others, such as family and social relationships [45]. When individuals perceive more peer support, they promote the development of peer relationships, which makes individuals more likely to stimulate

TABLE 2: Correlations between comfort, perceived social support, and hope (N = 534).

Variables	Mean (SD)	1	1-1	1-2	1-3	1-4	2	2-1	2-2	2-3	3	3-1	3-2	3-3
1. Comfort	94.1 (11.92)	1												
1-1. Physical	27.41 (3.82)	0.869**	1											
1-2. Psychospiritual	31.59 (4.83)	0.923**	0.695**	1										
1-3. Environmental	11.49 (1.58)	0.711**	0.493**	0.631**	1									
1-4. Sociocultural	23.61 (3.39)	0.888**	0.705**	0.741**	0.576**	1								
2. Perceived social support	72.74 (10.26)	0.383**	0.405**	0.308**	0.168**	0.371**	1							
2-1. Family support	25.04 (3.29)	0.360**	0.421**	0.275**	0.155**	0.326**	0.868**	1						
2-2. Friend support	23.75 (4.09)	0.355**	0.361**	0.293**	0.168**	0.345**	0.936**	0.707**	1					
2-3. Other supports	23.95 (3.83)	0.337**	0.338**	0.275**	0.138**	0.346**	0.933**	0.712**	0.831**	1				
3. Hope	40.55 (4.99)	0.531**	0.556**	0.442**	0.286**	0.474**	0.589**	0.632**	0.518**	0.480**	1			
3-1. Temporality and future	13.40 (1.88)	0.522**	0.520**	0.445**	0.309**	0.471**	0.514**	0.558**	0.452**	0.415**	0.907**	1		
3-2. Positive readiness and expectancy	13.71 (1.80)	0.324**	0.391**	0.254**	0.116**	0.283**	0.566**	0.579**	0.511**	0.471**	0.827**	0.591**	1	
3-3. Interconnectedness	13.44 (1.96)	0.555**	0.560**	0.469**	0.328**	0.498**	0.489**	0.546**	0.419**	0.392**	0.922**	0.813**	0.625**	1

**p < 0.001.

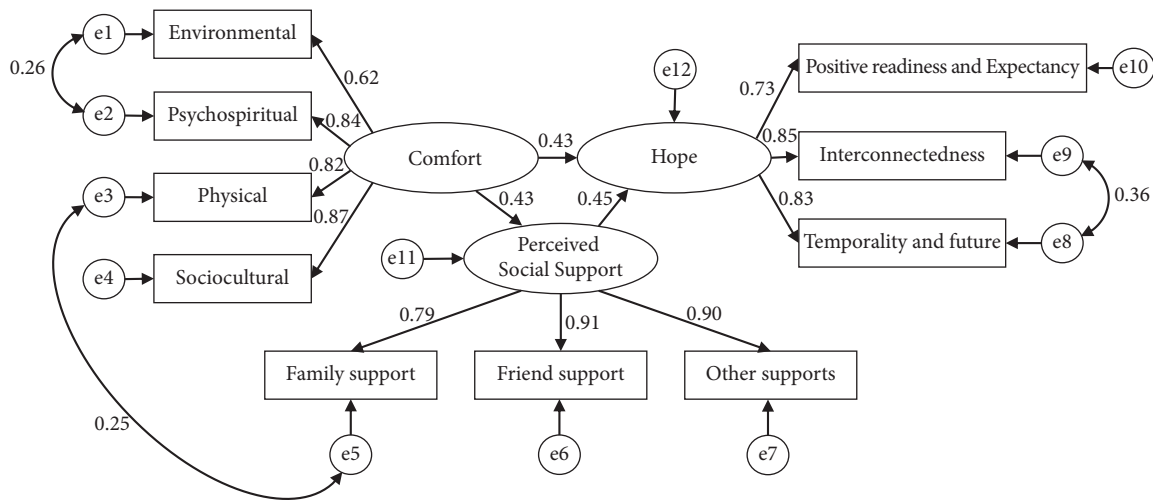


FIGURE 1: Path diagram for the hypothetical model.

TABLE 3: Results for the total, indirect, and direct effects of perceived social support on comfort with hope as a mediator (N = 534).

Model pathways	Estimate	SE	95% CI		Effect proportion (%)
			Lower	Upper	
Total effect	0.636	0.031	0.569	0.692	
Indirect effect	0.159	0.024	0.117	0.210	25.0
Direct effect	0.477	0.037	0.402	0.544	75.0

SE = standard error, CI = confidence interval.

internal motivation and seek effective methods of addressing challenges when handling setbacks and pressure situations as a means of improving their hope level [46]. The surrounding environment of patients with acute ischemic stroke changes when they are admitted to the hospital with a sudden illness. They are more sensitive to interpersonal relationships around them and are more likely to exhibit favorable social relationships and reduce the occurrence of bad emotions such as depression when they receive objective supportive behaviors or support resources from others [47, 48]. When patients feel a more optimal interpersonal relationship, they may enhance their expectations for the future, set goals, and believe that they can achieve them, thereby improving their hope level.

The results of this study revealed that perceived social support exerts a partial mediating role in the effect of comfort on hope. The comfort of patients with acute ischemic stroke exerts a direct effect on hope, and it, simultaneously, exerts an indirect effect on hope through perceived social support. According to the buffering effect model of social support, favorable social support can enable patients with high stress to avoid or suffer fewer adverse effects occasioned by stressful events [49]. When patients with acute ischemic stroke are faced with disability occasioned by their disease, various dysfunctions can lead to great stress [50]. These physical and psychological pains all appear suddenly with the disease [51]. However, when patients are in a more comfortable atmosphere, they feel more social support from family, friends, and other aspects.

Thus, the adverse impact of the disease on psychology can be weakened, and the patients can begin to actively cope with life and face the disease and have more confidence and hope for the treatment of the disease. This observation indicates that medical staff should not only consider the physical and psychological comfort of patients with acute conditions but also consider the impact of perceived social support on patients. The hope level of patients should be simultaneously enhanced from two aspects. Based on the path analysis of the mediating effect, the corresponding intervention plan was formulated to create a comfortable treatment process for patients and provide social support in many aspects. We can encourage patients to actively seek the help of family or friends to relieve economic or emotional pressure, reduce negative emotions, and finally face the disease and life with hope.

5. Conclusions

We reported that comfort, directly and indirectly, has a positive impact on hope. Particularly, perceived social support enhances the impact of comfort on hope; perceived social support mediates the relationship between comfort and hope. Clinical staff should correctly understand the relationship among the three variables, taking targeted strategies to enhance patient comfort and social support, thereby increasing the hope level among ischemic stroke patients and bolstering confidence in disease management.

6. Limitations

Due to the limited region and energy, this study adopted a cross-sectional survey, and the research object was obtained from a tertiary hospital; therefore, because the sample representativeness was limited, readers should be cautious when applying the findings to patients from other countries or different cultural backgrounds. Further studies should be conducted to expand the sample size and study population; thus, the conclusions of this study can be verified. Personalized interventions can also be formulated from the aspects of comfort and social support to increase the hope of patients.

Abbreviations

AIS:	Acute ischemic stroke
SEM:	Structural equation model
χ^2 :	Chi-square value
df:	Degrees of freedom
χ^2/df :	Ratio of the chi-square to degrees of freedom
RMSEA:	Root mean square error of approximation
GFI:	Goodness-of-fit index
NFI:	Normed fit index
IFI:	Incremental fit index
TLL:	Tucker–Lewis index
CFI:	Comparative fit index.

Data Availability

The processed data are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Yueyue He and Rui Wang contributed equally to the manuscript as co-first authors.

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Research Article

Mediator Effects of Cognitive Load on Association between Self-Efficacy and Task Load in Intensive Care Unit Nurses

P. Tingting,¹ D. Xun,¹ W. Jun,² D. Shu,^{3,4} and Z. Shan ⁴

¹Cardiac Center, Beijing Anzhen Hospital, Beijing 100029, China

²Respiratory Intensive Care Unit, Xuan Wu Hospital, Beijing 100053, China

³Department of Cardiology, Beijing Chao-Yang Hospital, Beijing 100020, China

⁴School of Nursing, Capital Medical University, Beijing 100069, China

Correspondence should be addressed to Z. Shan; shan1993ccmu@163.com

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Aims. To explore the mediating effect of cognitive load on the relationship between self-efficacy and task load among intensive care unit (ICU) nurses. **Background.** Studies related to ICU nurses' self-efficacy, cognitive load, and task load are noteworthy but limited. **Methods.** A total of 253 ICU nurses from three tertiary hospitals in Beijing were recruited and investigated by the Chinese version of the National Aeronautics and Space Administration-Task Load Index (NASA-TLX), General Self-Efficacy Scale (GSES), and an instrument for Measuring Different Types of Cognitive Load (MDT-CL) scales. SPSS 25.0 was used for Pearson correlation analysis and multiple linear regression analysis and mediation effect analysis using Model 4 in PROCESS (5,000 resamples). **Results.** Mediation analysis indicated that a partial mediating effect of extraneous cognitive load between self-efficacy and task load among ICU nurses was -0.707 (95% CI: $-0.940, -0.504$), accounting for 51.64% of the total effect. **Conclusion.** This study suggests that enhancing ICU nurses' self-efficacy can be a potential strategy to decrease extraneous cognitive load and task load. **Implications for Nursing Management.** Nursing administrators should actively implement intervention strategies based on influencing the task load pathway of ICU nurses to ensure they can provide safe and high-quality nursing services.

1. Introduction

The demand for nursing services is constantly increasing, and nurses are the most direct personnel to provide nursing care to patients, especially in intensive care units (ICUs) where nursing activities are characterized by extremely demanding workloads [1, 2]. ICU nurses need to possess the ability to make clinical decisions quickly, handle complex changes in patient conditions, and use special equipment. The complexity and urgency of the ICU environment often expose nurses to high-level mental task loads [1, 3]. Paula et al. [3] investigated 111 ICU nurses and 100% indicated a medium to high level of mental task load. Nursing administrators and researchers are paying more attention to the task load of nursing care. High-level task loads among ICU nurses can lead to physical and psychological problems, such as the increased risk of anxiety and depression, higher

occupational fatigue and turnover rate, missed nursing care, and increased nursing errors [4, 5]. For example, Boehm and colleagues surveyed 268 ICU nurses and found that for every additional point increase in task load (rated on a scale of 0–10), adherence to bundle interventions among ICU nurses decreased by 53% [4].

Studies have shown that self-efficacy and cognitive load were related to an individual's mental task load [6–8]. Self-efficacy is defined as the level of belief in one's ability to complete a heavy workload successfully [9]. Cognitive load is defined as the total amount of cognitive resources that a person requires to process cognitive tasks [10] and is composed of intrinsic, extraneous, and germane cognitive load [11]. Intrinsic cognitive load is defined as the demand for working memory in processing information elements and their interactions in related tasks [12]. Extraneous cognitive load is generated by inappropriate activity

presentation rather than the task itself [12]. Germane cognitive load increases schema construction, therefore promoting the execution of the task [12, 13]. Broad evidence has shown that self-efficacy also affects an individual's cognitive load [14, 15]. Jiang et al. [14] reported that self-efficacy in English reading among students is negatively related to intrinsic cognitive load. However, the mediating effect of cognitive load between self-efficacy and task load is unclear. Therefore, the study aimed to investigate the mediator effects of cognitive load on the association between self-efficacy and task load of ICU nurses.

2. Materials and Methods

2.1. Study Design and Samples. A cross-sectional questionnaire study design was conducted with convenience sampling at three tertiary hospitals between February and June 2023.

Registered nurses were eligible for the study if they consented to participate in this study. Nurses were excluded if they (a) had less than 1 year of intensive care experience, (b) currently did not work full-time in the ICU, and (c) had long leave with pay, such as sick or prenatal leave. A simple structural equation model (SEM) was used to analyze the relationship among self-efficacy, cognitive load, and task load, and a minimum of 200 patients was required to run the model as suggested by Shah and Goldstein [16].

2.2. Instruments. The questionnaire consisted of four parts: (a) demographic information; (b) the Chinese National Aeronautics and Space Administration-Task Load Index (NASA-TLX); (c) the Chinese General Self-Efficacy Scale (GSES); and (d) an instrument for Measuring Different Types of Cognitive Load (MDT-CL). Cronbach's α coefficient for the combined questionnaires was 0.732, indicating that the Chinese version of the NASA-TLX, GSES, and MDT-CL had acceptable reliability for ICU nurses.

2.3. Demographic Information. Demographic information included age, gender, education level, marital status, number of children, living situation, years of ICU working experience, professional title, number of night shifts per month, and number of patients cared for during the whole shift.

2.4. National Aeronautics and Space Administration-Task Load Index. The NASA-TLX was used to assess task load and was developed by Hart [17] and was translated into Chinese by Liling Liang and colleagues [18]. The NASA-TLX has 6 items: mental demand, physical demand, temporal demand, performance, effort, and frustration. Each item is scored on a Likert scale from 0 (low load) to 20 (high load), and the total score ranges from 0 to 120, with higher scores indicating a higher level of task load. The retest reliability of the scale was 0.806, and Cronbach's α coefficient was 0.707 [18]. Content validity in the Chinese version of NASA-TLX was 0.900, and the split-half

reliability was 0.808 [19]. The Chinese version of NASA-TLX has good consistency between each item and validity.

2.5. General Self-Efficacy Scale. The GSES was developed by Schwarzer [9] and was translated into Chinese version by Caikang Wang et al. [20]. The GSES consists of 10 items, and each item is scored on a 4-point Likert scale ranging from 1 ("not at all true") to 4 ("exactly true"). Example items are "If you try hard, you can always accomplish a task efficiently" and "Even objected by others, you still can manage to get what you want." A single score for the GSES is computed using the total score of all items. A higher total score indicates a higher level of self-efficacy. The Chinese version of the GSES has shown good reliability and validity for Chinese adults [20, 21]. Cronbach's α coefficient was 0.870, retest reliability was 0.830 ($P < 0.001$), and split-half reliability was 0.820 ($n = 401$, $P < 0.001$) [20].

2.6. An Instrument for Measuring Different Types of Cognitive Load. The MDT-CL was used to assess three types of cognitive load. The MDT-CL was developed by Leppink and colleagues [12] and was translated into Chinese version by Zhang et al. [13]. A ten-item questionnaire was presented for the measurement of intrinsic cognitive load (items 1, 2, and 3), extraneous cognitive load (items 4, 5, and 6), and germane cognitive load (items 7, 8, 9, and 10). Example items are "The intensive care activity/activities presented in daily usual care was/were very complex" for intrinsic cognitive load, "The instructions and/or explanations in daily usual care during implementing intensive care activity/activities were very unclear" for extraneous cognitive load, and "Daily usual care enhanced my understanding of the intensive care activity/activities covered" for germane cognitive load. Each item scores from 0 ("not at all") to 10 ("completely"), the higher the score, the higher the cognitive load. The Chinese version MDT-CL has good reliability and validity, and Cronbach's α was 0.818; Cronbach's α in measurement of intrinsic, extraneous, and germane cognitive load was 0.879, 0.878, and 0.946, respectively [13].

2.7. Data Collection. Before the study commencement, the investigators received research training about how to use standardized instruments to ensure the collected data were consistent and accurate. Data collectors recruited ICU nurses based on the inclusion and exclusion criteria, and the aim and procedure of the study were fully explained to all eligible nurses before the recruitment. This survey was conducted anonymously, utilizing online responses via mobile phones. To ensure the accuracy and effectiveness of the questionnaire, any questions related to the study were answered by the investigators during the completion of the questionnaire. All of the questions refer to the daily nursing activity that just finished. For instance, "The nursing activity presented in daily usual care that I perceived as very complex," "The instructions and/or explanations in daily usual care were, in terms of clinical application, very

ineffective,” and “Daily usual care enhanced my knowledge and understanding of nursing.” After completing the questionnaire, all data were entered into a database by two researchers who conducted extensive error and validity checks. The quality of the questionnaires was checked, and any questionnaires with identical answers or missing answers to more than two-thirds of the questions were excluded.

2.8. Informed Consent and Ethical Considerations. The institutional review board of the university approved this study (approval number: Z2019SY021). Written informed consent was obtained from all ICU nurses after the investigators introduced the study procedures in detail. The eligible ICU nurses had the right to withdraw from the study at any time without any harmful consequences.

2.9. Data Analysis. The SPSS version 25.0 (SPSS Inc., Chicago, IL) was used for data analyses, cases with missing data in self-efficacy, cognitive load, and task load, or with missing covariates (age, gender, educational level, and years of ICU working experience) >35% were excluded from the final analysis, and others were processed using multiple imputations if the missing is in random [22]. Continuous variables were described as means and standard deviation (SD) for normal and medians and inter-quartile range for abnormally distributed data. The relationship among self-efficacy, cognitive load (intrinsic, extraneous, and germane cognitive load), and task load (dichotomous variable) was verified using the Pearson correlation test. Finally, the significant factors ($P < 0.05$) were selected to enter a multiple linear regression analysis. The standardization coefficient (β) and standard error (SE) were used to express the strength of the association. Finally, all significant variables that were identified by the multivariate linear regression were entered into the structural equation model (SEM). Harman’s single-factor test was used to examine common method variance with self-report measures [23]. Model 4 test in PROCESS in SPSS (an add-on for SPSS) was used for mediation analysis of task load, self-efficacy, and cognitive load [24]. The bootstrap method with a 95% bias-corrected confidence interval (CI) was used to test the significance of the mediation effect. The statistical significance was set at $P < 0.05$, with two-tailed testing.

3. Results

3.1. General Characteristics of the Participants. A total of 265 questionnaires were distributed, and 253 (95.47%) valid questionnaires were returned. The average age was 32.91 years (SD = 6.30; range between 21 and 52 years), and 65.3% are female (Table 1). The mean years of ICU working experience were 9.81 years (SD = 5.18), and most of the ICU nurses (86.6%) reported working night shifts.

TABLE 1: The sociodemographic characteristics of ICU nurses (N = 253).

Variables	n (%)
<i>Gender</i>	
Male	88 (34.7)
Female	165 (65.3)
<i>Age (years)</i>	
20–30	77 (30.4)
31–40	152 (60.1)
>40	24 (9.5)
<i>Ethnicity</i>	
Han	239 (94.6)
Manchu	7 (2.7)
Others	7 (2.7)
<i>Education level</i>	
High school	74 (29.2)
Bachelor degree	179 (70.8)
<i>Marital status</i>	
Married	162 (64.0)
Unmarried	84 (33.3)
Divorce	7 (2.7)
<i>ICU working experience (years)</i>	
1–5	51 (20.2)
6–10	91 (36.0)
11–15	74 (29.2)
>15	37 (14.6)
<i>Living situation</i>	
Living with family	206 (81.4)
Alone	13 (5.2)
Share-house with others	34 (13.4)
<i>Working night shifts</i>	
Yes	219 (86.6)
No	34 (13.4)
<i>Number of night shifts per month</i>	
0	27 (10.7)
1–5	7 (2.7)
6–10	209 (82.6)
≥11	10 (4.0)
<i>Number of patients cared for during the day shift</i>	
0–2	239 (94.5)
≥3	14 (5.5)
<i>Number of patients cared for during the night shift</i>	
0–2	250 (98.8)
≥3	3 (1.2)
<i>Professional title</i>	
Primary nurse aide	37 (14.6)
Senior nurse	101 (39.9)
Supervisor nurse	115 (45.5)
<i>Average overtime hours per week</i>	
0	30 (11.8)
1–5	81 (32.0)
5–10	54 (21.3)
10–15	67 (26.5)
>15	21 (8.3)
<i>ICU specialty nurse</i>	
Yes	104 (41.1)
No	209 (58.9)

3.2. Correlation among Major Variables. The ICU nurses showed high levels of task load with an overall NASA-TLX score of 86.49 ± 15.05 , and 42.69% (108/253) of ICU nurses had a high-level task load (overall NASA-TLX score ≥ 90). The score of each item was as follows: mental demand (15.17 ± 3.30), physical demand (16.87 ± 2.97), temporal demand (15.46 ± 3.32), performance (16.01 ± 2.92), effort (11.47 ± 5.96), and frustration (11.49 ± 5.47).

As shown in Table 2, statistically significant differences were observed between task load and self-efficacy ($r = -0.437$, $P < 0.001$), task load and intrinsic cognitive load ($r = 0.373$, $P < 0.001$), and task load and extraneous cognitive load ($r = 0.636$, $P < 0.001$). However, no significant differences were found between task load and germane cognitive load ($r = -0.051$, $P > 0.05$).

3.3. Factors Affecting Task Load. The self-efficacy, intrinsic cognitive load, and extraneous cognitive load were entered into regression analysis with enter forwards selection due to these factors being statistically related to task load. As shown in Table 3, after adjusting covariates (age, gender, educational level, and years of ICU working experience), the results indicated that only self-efficacy ($\beta' = -0.202$, $P < 0.001$) and extraneous cognitive load ($\beta' = -0.520$, $P < 0.001$) were statistically explained task load.

3.4. Structural Model. Harman's single-factor test showed that the cumulative variance interpretation was 28.26%, which is lower than the critical standard of 40% [25], illustrating that common method variance was not significant in this study.

Figure 1 shows the mediation model.

The direct and indirect effects of the model are summarized in Table 4. The results showed that self-efficacy significantly predicted extraneous cognitive load ($a = -0.728$, $SE = 0.102$, $P < 0.001$), extraneous cognitive load was shown to be a significant predictor of task load ($b = 0.971$, $SE = 0.093$, $P < 0.001$), and self-efficacy also had a direct effect on task load ($c' = -0.662$, $SE = 0.163$, $P < 0.001$). The bias-corrected percentile Bootstrap method test showed that extraneous cognitive load partially mediated the relationship between self-efficacy and task load ($a * b = -0.707$, 95% CI: -0.940 , -0.504 ; $SE = 0.112$; $P < 0.001$). The mediation effect accounted for 51.64% of the total effect.

4. Discussion

In this cross-sectional design study, 253 ICU nurses were investigated to explore the mediator effects of cognitive load between self-efficacy and task load. We found that 42.69% of ICU nurses had high levels task load, and correlations analysis reported self-efficacy was negatively related to task load, but intrinsic and extraneous cognitive load were positively related to task load. However, after adjusting covariates in multiple linear regression analysis, only self-efficacy and extraneous cognitive load were statistically explained task load. A three-factor mediation model was

constructed and tested, and the relationships between self-efficacy and task load were partially mediated by extraneous cognitive load among ICU nurses, accounting for 51.64% of the total effect. The findings imply that even though the perceived task load of ICU nurses was affected by both poor self-efficacy and high-level extraneous cognitive load from daily intensive care activities, the influence of self-efficacy can be increased if extraneous cognitive load declines. Therefore, early assessment of self-efficacy and cognitive load for ICU nurses may benefit from targeted prevention strategies.

The partially mediating role of extraneous cognitive load between overall self-efficacy and task load of ICU nurses was confirmed in our study. In other words, an individual's self-efficacy not only has a direct effect on task load but also has an indirect effect through extraneous cognitive load. ICU nurses with high-level self-efficacy are always able to cope with unexpected issues and come up with solving strategies [26, 27]. These abilities weaken the high level of the extraneous cognitive load caused by unclear instructions for nursing activities in daily nursing practice, thereby reducing the task load in terms of mental demand, physical demand, temporal demand, performance, effort, and frustration for ICU nurses. Highlighting the meaningfulness of high-level self-efficacy and low-level extraneous cognitive load might contribute to a decreased perceived task load.

Regarding the relationship between self-efficacy and perceived task load among ICU nurses, it has been found that high levels of self-efficacy were associated with lower levels of task load. The findings from this study were confirmed by other studies [7, 8]. Cayupe et al. [7] recruited 300 primary school teachers to examine the mediating role of job satisfaction between self-efficacy, life satisfaction, workload, and overall life satisfaction. They also found that self-efficacy was negatively related to workload ($r = -0.43$). In addition, Molero et al. [8] investigated 1307 nurses in a cross-sectional study and reported that workload had a significant negative relationship with perceived self-efficacy ($r = -0.07$; $P < 0.01$).

It is likely because ICU nurses with high-level of self-efficacy are more capable of coping with the workload brought on by the high-intensity working environment. They are more likely to adopt proactive strategies to alleviate challenges from intensive tasks, such as participating in education programs, flexibly adjusting resource allocation, generating effective work plans, and time management strategies, and having good team cooperation ability; these strategies could help ICU nurses alleviated the perceived task load [28–30]. Therefore, the nursing administrator should provide job support to increase self-efficacy among ICU nurses, which would empower and motivate them to cope with an intensive task load.

Our study also examined the correlation between extraneous cognitive load and task load, indicating that the high level of extraneous cognitive load from unclear instructions in daily intensive care activities was positively related to higher perceived task load. Nasirizad and colleagues [31] conducted a cross-sectional study among 105 ICU nurses. They confirmed a significant relationship between cognitive and task load ($P < 0.001$). Based on the Cognitive Load Theory (CLT),

TABLE 2: Descriptive statistics and correlations of the study variables ($N = 253$).

	1	2	3	4	5
(1) Self-efficacy	1.000				
(2) Intrinsic cognitive load	-0.332**	1.000			
(3) Extraneous cognitive load	-0.410**	0.474**	1.000		
(4) Germane cognitive load	0.221**	0.053	-0.262**	1.000	
(5) Task load	-0.437**	0.373**	0.636**	-0.051	1.000
Mean	25.166	23.593	16.233	34.968	86.458
Standard deviation	4.805	7.444	8.495	7.529	15.054
Skewness	0.121	-0.934	-0.089	-0.476	-0.047
Kurtosis	-0.129	0.617	-0.959	-0.496	-0.321

Note. ** $P < 0.05$.

TABLE 3: The results of multiple linear regression analysis on the influencing factors of task load in ICU nurses ($N = 253$).

Variable	β	SE	β'	t -value	P value	95% CI (β)
Constant	95.750	8.940	—	10.710	<0.001	78.141, 113.359
Self-efficacy	-0.633	0.165	-0.202	-3.831	<0.001	-0.958, -0.307
Intrinsic cognitive load	0.131	0.113	0.065	1.165	0.245	-0.091, 0.354
Extraneous cognitive load	0.922	0.102	0.520	9.048	<0.001	0.721, 1.123

Note. β = nonstandardized coefficient; β' = standardized coefficient; $R^2 = 0.453$; adjusted $R^2 = 0.438$; $F = 29.027$; $P < 0.001$; Durbin-Watson = 1.859.

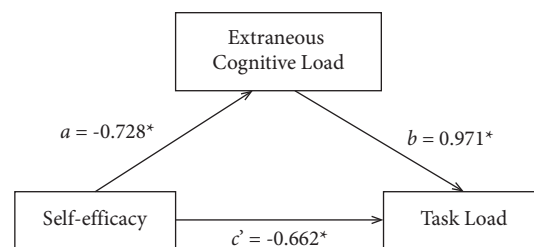


FIGURE 1: Mediation model of extraneous cognitive load on the relationship between self-efficacy and task load of ICU nurses. Note: All coefficients are significant ($P < 0.001$).

TABLE 4: Effect analysis of extraneous cognitive load as a mediator between self-efficacy and task load in ICU nurses ($N = 253$).

Effect	Path	β	Bias-corrected 95% CI	SE	t -value	P value
Direct effect	Self-efficacy \rightarrow task load	-0.662 (c')	-0.984, -0.341	0.163	-4.057	<0.001
Indirect effect	Self-efficacy \rightarrow extraneous cognitive load	-0.728 (a)	-0.929, -0.527	0.102	-7.144	<0.001
	Extraneous cognitive load \rightarrow task load	0.971 (b)	0.788, 1.154	0.093	10.467	<0.001
Total effect	Self-efficacy \rightarrow task load	-1.369	-1.721, -1.018	0.178	-7.681	<0.001

Note. Adjusting for covariates, including age, gender, educational level, and years of ICU working experience.

the human cognitive resources are limited, and once the cognitive resources required for the cognitive tasks to be processed exceed the total cognitive resources of human beings, cognitive load increases and results in unsatisfactory task performance [10]. The extraneous cognitive load can be derived from suboptimal presentation methods and unclear instruction of activities [12]. Therefore, nursing administrators should identify and modify the factors that increase the extraneous cognitive load in nursing practice, for example, by simplifying nursing processes and improving collaboration mechanisms. In addition, administrators can introduce appropriate information technology-assisted tools, such as intelligent devices, to improve the presentation mode of interventions, provide decision support, and alleviate the nurse's extraneous cognitive load [32, 33].

4.1. Limitations and Future Research. This study has several limitations. First, the ICU nurses were recruited from three tertiary hospitals in one region, which limits the generalisability of the study findings to different populations and regions. In the future, expanding the sample collection is recommended to identify differences between region levels. Second, the nature of the cross-sectional study limited the possibility of drawing causal relationships among the variables. To gain a better understanding of the relationship between self-efficacy, cognitive load, and task load in ICU nurses, prospective longitudinal studies were recommended to confirm causal relationships in the future. Finally, the investigated variables in this study were collected by self-report questionnaires, which may lead to recall bias. For future studies, objective

measurements of task load, such as pupil diameter, heart rate variability (HRV), and electroencephalography (EEG), are recommended [34, 35].

5. Conclusions

In this cross-sectional study, we concluded that self-efficacy and lower extraneous cognitive load could help defend against the adverse impact of increased task load among ICU nurses. Self-efficacy influences the task load, and extraneous cognitive load partially mediates the correlation. Therefore, nursing managers should strengthen the assessment and monitoring of self-efficacy and cognitive load in ICU nurses and tailor effective support strategies to reduce task load. To sum up, self-efficacy is a crucial resource in the ICU nursing work environment with positive impacts on well-being (e.g., reducing physical demand and frustration).

6. Implications for Nursing Management

Given that self-efficacy has beneficial consequences for nurses' cognitive load and task load, interventions directed at three factors can be carried out. Nursing administrators need to pay attention to the measurement of nurses' self-efficacy, cognitive load, and task load, focus on the presentation of nursing activities and other factors that may affect the source of task load for ICU nurses, and provide targeted intervention measures. For example, nursing administrators should promote the development of strong cooperation among nursing teams (e.g., gratitude for the help and mutual appreciation) to work together in high-pressure and complex ICU work environments. These effective strategies for enhancing self-efficacy and improving the cognitive load of nurses can help them to reduce work burden and pressure, thereby improving their job satisfaction, physical and mental health, and work performance.

Data Availability

The original data used to support the findings of this study are included within the S1 File.

Disclosure

This work was supported by the R&D Program of the Beijing Municipal Education Commission, but they had no role in the study design, data collection, data analysis, data explanation, or manuscript writing.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Supplementary Materials

S1 File: the dataset for data analysis. (*Supplementary Materials*)

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Review Article

Mobile Application-Based Interventions for People with Heart Failure: A Systematic Review and Meta-Analysis

Yun-Xia Ni , Xue-Hui Liu, Li He, Ya Wen , and Gui-Ying You 

Department of Cardiology, West China Hospital, Sichuan University/West China School of Nursing, Sichuan University, Chengdu, China

Correspondence should be addressed to Ya Wen; wenya223@126.com and Gui-Ying You; guiying_you@163.com

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Aim. To examine the effectiveness of mobile health application-based interventions on mortality, hospitalization rate, self-care, and quality of life in people with heart failure. **Background.** Mobile health application-based interventions are reported to potentially help people with heart failure improve health-related clinical outcomes. However, evidence on the effects of mobile health application-based interventions on mortality, hospitalization, self-care, and quality of life remains inconclusive and limited. **Methods.** A systematic literature search was conducted in six databases (MEDLINE, CINAHL Plus with Full Text, PsycINFO, Web of Science, EMBASE, and CENTRAL) to identify relevant studies from inception to 21 October 2023. Two authors independently extracted the data and assessed the risk of bias using the Cochrane risk-of-bias tool. The meta-analysis was conducted in Review Manager (version 5.4) and the statistical software R 4.3.3. Sensitivity analysis and subgroup analysis were also performed. The certainty of the evidence was evaluated by the GRADE approach. **Results.** Twenty-four studies involving 2886 participants were identified in this review. The pooled analysis showed that mobile health application-based interventions had statistically significant beneficial effects on reducing heart failure-related hospitalization (RR = 0.72, 95% CI 0.57 to 0.91, $p = 0.01$) and improving quality of life (SMD = 0.46, 95% CI 0.09 to 0.83, $p = 0.02$), but had no statistically significant effects on all-cause mortality (RR = 0.90, 95% CI 0.66 to 1.25, $p = 0.47$), cardiovascular mortality (RR = 0.87, 95% CI 0.59 to 1.26, $p = 0.24$), all-cause hospitalization (RR = 0.74, 95% CI 0.39 to 1.42, $p = 0.29$), or self-care (MD = -2.42, 95% CI -15.07 to 10.24, $p = 0.64$). Subgroup analyses indicated that intervention duration and monitoring frequency may influence the effects of mobile health application-based interventions on quality of life. **Conclusions.** Mobile health application-based interventions were effective at reducing heart failure-related hospitalization and improving quality of life in people with heart failure. More well-designed randomized controlled trials are needed to strengthen the evidence. **Implications for Nursing Management.** Mobile health application-based interventions may have benefits for improving heart failure-related hospitalization and quality of life. More rigorous studies are warranted to confirm the effects of mobile health application-based interventions for people with heart failure.

1. Introduction

Heart failure is considered a global health care problem since it is associated with a high hospitalization rate, increased mortality, and impaired quality of life, leading to a heavy economic burden on global health care systems [1, 2]. Current guidelines suggest that continuous medical therapy and patient self-care play a core role in improving the prognosis of heart failure [3]. Self-care in heart failure refers to the specific health behaviors that patients perform to manage their disease and promote health [4]; these behaviors typically include daily weight monitoring, symptom

recognition, medication adherence, lifestyle changes, and regular follow-up [3]. Appropriate treatment adherence and optimal self-care have positive effects on patients' outcomes (e.g., decreased mortality and improved quality of life) [5, 6]. Despite the proven benefits of self-care, people with heart failure exhibit poor self-care behaviors [7–9]. Only 42% of patients persistently undertake good self-care behavior [9]. Studies have shown that unmet needs for disease knowledge and limited access to healthcare providers are the main barriers to self-care for people with heart failure [10, 11].

Recent advances in information technology have offered opportunities to address and resolve self-care barriers for

people with heart failure. Mobile health (mHealth) is defined as the use of mobile devices (e.g., smartphones, tablets, personal digital assistants—PDAs, and other mobile devices) to deliver health care services outside of hospital settings [12]. Mobile application is one of the typical and popular delivery methods for mHealth worldwide [13]. Interventions based on mobile health applications have the potential to educate one on one at any convenient time and place, collect real-time data, track heart failure signs and symptoms, and provide quick health advice [14, 15]. Previous trials demonstrated that mobile applications can promote patient adherence to medication, self-monitoring of symptoms, and healthy lifestyles, which contribute to lower rehospitalization rates and improved quality of life [15–17]. Although the potential of mobile health application-based interventions has been well established in recent years, the effectiveness of such interventions for people with heart failure is mixed [18–20]. For example, Jiang et al. [17] reported that smartphone application use could improve self-care and quality of life among people with heart failure, while no effect on self-care was found in another article [20].

Several systematic reviews have assessed the effects of mobile health application-based interventions on people with heart failure. Kitsiou et al. [21] revealed that mobile health interventions (such as mobile applications, text messages, and remote mobile monitoring) were effective at reducing mortality and heart failure-related hospitalizations. Son et al. [22] reported that mobile phone-based interventions, including voice calls, telemonitoring, short messaging services, and mobile applications, could reduce the length of hospital stay for people with heart failure. However, these reviews combined various mHealth interventions in one study instead of focusing on specific application-based interventions [21–23], which may confound the true effects of application-based interventions. One review tested the effect of mobile applications, but the participants were mixed patients with various cardiovascular diseases (i.e., hypertension, heart failure, stroke, and cardiac rehabilitation populations) and not categorizing for heart failure [24]. Athilingam and Jenkins [25] qualitatively synthesized the effects of mobile phone application interventions and found inconsistent effects on self-care management. In their review, the randomized controlled trials (RCTs), pilot RCTs, and prepost intervention design trials were included. One recent systematic review examined the effectiveness of mobile health applications on mortality, hospitalization rate, and quality of life, but the applications were limited to telemonitoring applications, and applications with no remote monitoring functionality were not included [26]. Additionally, this review did not assess the effects on self-care and only included articles published between 2000 and 2021. Alves Leite de Barros et al. [13] conducted a review on the effects of mobile health applications on people, focusing on medication adherence, but the authors did not evaluate mortality, hospitalization, self-care, or quality of life. Thus, existing reviews cannot provide sufficient evidence on the effects of mobile health application-based interventions on mortality, hospitalization, self-care, and quality of life in people with heart failure.

Moreover, as the field of information technology has advanced, there has been rapid growth in mobile application intervention research. There shall be more rigorous data synthesis to inform the effects of mobile health application-based interventions to guide heart failure management. Therefore, this systematic review aims to quantitatively analyze the evidence of mobile health application-based interventions to determine its pooled effects on mortality, hospitalization rate, self-care, and quality of life for people with heart failure.

2. Methods

This systematic review and meta-analysis were registered in the International Prospective Register of Systematic Reviews (PROSPERO protocol number: CRD42023492005) and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A Measurement Tool to Assess Systematic Review 2 (AMSTAR2) was followed to ensure the quality of this review [27].

2.1. Literature Search. A comprehensive search was performed from inception to 21 October 2023 across six electronic databases: MEDLINE, CINAHL Plus with Full Text, PsycINFO, Web of Science, EMBASE, and CENTRAL. The search strategy used a combination of medical subject headings (MeSH) and text words, such as “heart failure,” “cardiac failure,” “mobile applications,” “mobile health,” and “smartphone.” Appropriate Boolean operators were used to combine these MeSH terms and text words to retrieve all relevant studies. The limiters were English language articles. A manual search through the reference lists of the included articles and previously published relevant reviews was also conducted to retrieve any additional studies. The detailed search strategy is presented in Supplementary Material Table S1.

2.2. Inclusion and Exclusion Criteria. The articles were included if they met the following PICOS criteria: (1) population: adults diagnosed with heart failure; (2) intervention: any mobile health applications used either as a standalone or combined with other delivery modes, such as telephone calls, text messages, or telemonitoring. The applications offer an interface through any kind of mobile device, for example, a smartphone, tablet computer, or PDA; (3) comparison: usual care, standard care, routine care, waitlist control or health education without mobile application; (4) studies including at least one of the following outcomes: mortality, hospitalization rate, self-care, or quality of life; and (5) study design: RCTs or pilot RCTs.

The exclusion criteria were as follows: (1) mixed participants with various chronic diseases or general cardiac disorders (e.g., hypertension, coronary heart disease, and atrial fibrillation) but not categorizing for heart failure; (2) primary intervention were telephone calls, videoconferences, e-mail, online social networking, or any other mobile intervention without applications; (3) comparisons were

made between different applications in both the intervention group and control group; (4) applications as a control group compared to other mobile technology-based interventions, such as automated telemonitoring devices; (5) incomplete studies, such as study protocols or incomplete data; and (6) conference abstracts, book chapter reviews, or editorials.

2.3. Study Selection and Data Extraction. The results of the literature search were exported to EndNote x9 software. After removing duplicates, two authors independently screened the titles and abstracts of the studies based on the inclusion and exclusion criteria. Then, full-text assessment of potentially relevant studies was conducted by the same two authors to select the eligible studies to be included in this review. Any disagreements were discussed with a third reviewer to reach a consensus.

Data from the included studies were independently extracted by two authors using predesigned data collection forms guided by the Cochrane Handbook [28]. The extracted data included author, year, country, sample size, sample characteristics (e.g., age, gender), intervention characteristics (e.g., key component, frequency and duration, mobile device, and delivery personnel), control characteristics, outcomes and measurement tools, and grants. The corresponding authors were contacted by e-mail for missing information when the data were incomplete. Disagreements were resolved by discussion with a third reviewer.

2.4. Quality and Evidence Assessment. Two authors assessed the methodological quality of the included studies using the Cochrane Risk-of-Bias Tool [29]. Disagreements were resolved by discussion with a third reviewer. This risk tool includes seven domains: random sequence generation (selection bias), allocation concealment (selection bias), blinding of participants and personnel (performance bias), blinding of outcome assessment (detection bias), incomplete outcome data (attrition bias), selective reporting (reporting bias), and other bias. Each domain was rated as having a low risk of bias, a high risk of bias, or an unclear risk of bias. The certainty of evidence was independently evaluated by two reviewers using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach [30], which classified the certainty of the evidence into four classes (high, moderate, low, or very low) from five aspects (risk of bias, inconsistency, indirectness, imprecision, and publication bias). The Grading of Recommendations Assessment, Development, and Evaluation Profiler Guideline Development Tool (GRADEpro GDT) was applied to develop the GRADE evidence profile.

2.5. Data Synthesis and Analysis. A descriptive synthesis was performed to describe the characteristics of the included studies. All the statistical analyses for the meta-analysis were performed with Review Manager 5.4 and the statistical software R 4.3.3. Binary outcomes were calculated by the risk ratio (RR) with 95% confidence intervals (CIs) using the Mantel-Haenszel method, and statistically significant RRs

were translated into numbers needed to treat (NNT) to determine clinical relevance. For continuous data measured using the same tools, mean differences (MDs) with 95% CIs were used to determine the effects of the intervention. For continuous data measured using different tools, standardized mean differences (SMDs) with 95% CIs were computed using the generic inverse variance method [28]. The effect size was evaluated by Cohen's *d* (0.20–0.49 indicated a small effect, 0.50–0.79 a moderate effect and ≥ 0.80 a large effect) [31]. The overall effect was determined using Z-statistics with $p < 0.05$.

A random-effects model with restricted maximum likelihood estimation was used based on the clinical and methodological heterogeneity across the included studies [32, 33]. The Knapp-Hartung adjustments were conducted for 95% CIs of pooled effect sizes to reduce the risk of false positives. The 95% prediction intervals (PIs) were also calculated [34]. The statistical heterogeneity of the included studies was assessed using the I^2 statistic and Cochran's *Q* test. I^2 values of 0% to 40%, 30% to 60%, 50% to 90%, or 75% to 100% indicated unimportant, moderate, substantial, or considerable heterogeneity, respectively [28]. Possible sources of heterogeneity between studies were explored by subgroup analyses (i.e., duration of intervention, mobile device, frequency of monitoring, and delivery personnel). For studies with a multi-arm profile, the relevance to this review scope was assessed to create a single pairwise comparison for the main analysis according to the Cochrane Handbook [28]. When the studies reported the medians and interquartile ranges, the means and standard deviations were estimated following the recommendations of McGrath et al. [35]. A sensitivity analysis was performed by excluding one study at a time to test the robustness and reliability of the pooled results [36]. Egger's regression test and funnel plots were used to detect potential publication bias.

3. Results

3.1. Study Selection. The PRISMA flowchart of the literature search and selection process is shown in Figure 1. A total of 4208 records were retrieved from electronic databases, and 8 records were searched manually through the reference lists of the included articles and previously published relevant reviews. After removing duplicates and screening for titles and abstracts, 79 studies remained for full-text assessment. Finally, 24 studies met the inclusion criteria and were included in this review.

3.2. Characteristics of the Included Studies. The characteristics of the included studies are shown in the Supplementary Material Table S2. A total of 2886 individuals with heart failure were involved from 24 studies, with sample sizes ranging from 18 to 710. Twenty-three studies [14–16, 18–20, 37–53] were two-arm trials, and one was a three-arm trial [17]. All the studies were published between 2009 and 2023, and 62.5% (15/24) of the studies were published after 2020. The studies were conducted in Europe ($n = 10$), North America ($n = 6$), Asia ($n = 6$), Oceania

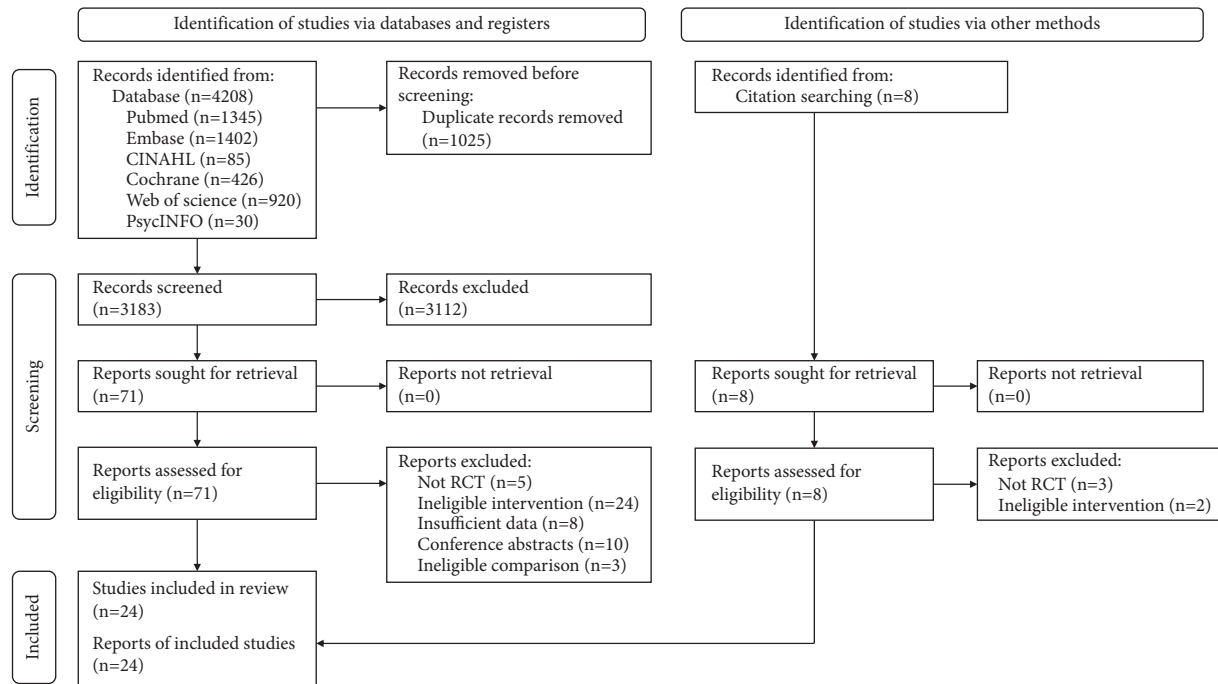


FIGURE 1: PRISMA flow diagram.

($n=1$), and South America ($n=1$). The mean age of the participants ranged from 50.0 to 79.9 years, and the percentage of female participants ranged from 7% to 69.8%. Twenty-three studies involving 2855 participants reported the New York Heart Association (NYHA) classification (a classification system used to assess functional exercise capacity and symptom severity of patients), and approximately 50% presented with NYHA class III or IV. Left ventricle ejection fraction (LVEF) was described in 19 studies, 13 of which reported a reduced ejection fraction $\leq 40\%$.

3.3. Characteristics of Interventions and Comparators. Five studies delivered interventions via basic mobile phones, 11 studies via smartphones, 6 studies via tablets, and 2 studies via the PDA. All the studies conducted the interventions in participants' homes. The interventions were implemented by different personnel, including physicians, clinicians, cardiologists, or geriatricians, in 8 studies; nurses in 8 trials; multidisciplinary care teams in 5 studies; and study coordinators in 1 study. Two studies did not report any information about the personnel.

3.3.1. Key Features of the Mobile Application-Based Interventions. The functionalities provided by the applications varied among studies. The seven key features of the applications included (1) reminders and notifications (i.e., reminding the participants to use the application, perform self-monitoring, or take medicine); (2) self-monitoring and assessment (i.e., conducting self-monitoring and recording vital parameters and symptoms, such as blood pressure, heart rate, and weight); (3) goal-setting (i.e., setting up

a tailored goal for participants, such as physical activity); (4) health education (i.e., providing health information or resources related to heart failure); (5) feedback and alerts (i.e., providing clinician feedback and alerts based on physiological and symptom information); (6) tele-coaching (i.e., providing personalized recommendations and modifying the treatment); and (7) social interaction (i.e., access to chat rooms, discussion forums, and interactions with companions and professionals). The details of the interventions are summarized in the Supplementary Material Table S2.

Reminders and notifications: fifteen studies used applications that offered reminders and notifications. Visual or audible reminders or push notifications were sent to patients to remind them to take measurements (e.g., weight and blood pressure), answer the questionnaire (e.g., symptom assessment), or use the application.

Self-monitoring and assessment: all but one study [19] used applications with self-monitoring and assessment features. In 13 of these studies, physiological data (e.g., weight and heart rate) were automatically sent to mobile devices via wireless Bluetooth or wearable technology. Seven studies recorded the measurement values manually. Three studies did not report whether the measurements were manually recorded or automatically recorded. The most frequently monitored parameters across studies were weight ($n=20$), blood pressure ($n=13$), heart failure symptoms ($n=12$), and heart rate ($n=7$).

Goal-setting: three studies used applications that had goal-setting. Saleh et al. [15] set up a weekly goal for physical activity via the mobile health applications. Clays et al. [48] and Wita et al. [16] developed personalized physical exercise schemes or individualized care plans based on patient parameter trends.

Health education: thirteen studies used applications that offered health information and resources in various formats (e.g., text, photos, videos, question, and answer games). Health information involves various aspects of heart failure, such as pathophysiology, symptoms, symptom management, lifestyle, treatment, and self-care behavior.

Feedback and alerts: twenty studies used applications with feedback and alert features. Participants received feedback and alerts via e-mail, messages, calls or screen color classification (e.g., Red Zone) [44] when the reported vital parameters were outside the target range or when symptoms indicated possible worsening of heart failure. Feedbacks or alerts were generated based on medical staff assessments (delayed) [46, 50] or automatically generated by machines (immediate) [20, 41].

Tele-coaching: eight studies used applications with a tele-coaching feature. The tele-coaching included a clinical consultation, therapy modification (e.g., an extra dose of diuretic), an early office visit, and exercise prescription adjustment.

Social interaction: four studies used applications that allowed interactions. Among these studies, one study allowed patients to share their behavioral progression and daily goal achievement with their companions [15], and all four studies provided chat rooms or discussion forums for interactions between patients and professionals.

3.3.2. Dosage (Duration and Frequency) of Mobile Application-Based Interventions. The duration of the mobile health application-based interventions varied among the included studies, ranging from 4 weeks to 24 months. Seven studies had the duration of mobile application-based interventions for 3 months. Six studies implemented the mobile application-based interventions for 6 months. Two studies reported the duration of the interventions for 12 weeks, two for 12 months, and two for 24 months. The remaining studies had the duration of mobile application-based interventions for 4 weeks, 6 weeks, 45 days, 8 weeks, or 240 days. The follow-up period ranged from 30 days to 2 years. Nineteen studies had daily self-monitoring for blood pressure, heart rate, weight, or symptoms. Three studies had weekly monitoring for the ECG. Twelve studies provided real time feedback or alerts. Further details are shown in the Supplementary Material Table S2.

3.3.3. Empowerment Strategies. Eight studies [14, 15, 17, 19, 20, 44, 46, 51] incorporated empowerment strategies and behavior change strategies in the applications. Cichosz et al. [46] reported that the core concept of the intervention was patient empowerment, achieved by increasing patients' coping capabilities through self-monitoring. Saleh et al. [15] used the Theory of Planned Behavior to guide interventions and empower patients with the ability to perform physical activity. Johnson et al. [51], Athilingam et al. [44], and Kiyarosta et al. [14] reported that daily prompts or encouragement messages were sent to the

patients in the intervention group. Another three studies [17, 19, 20] demonstrated that patients were motivated to engage in self-management behavior through various types of education information or daily messages. One study [48] embedded psychological support in applications, which included cognitive behavioral interventions and mindfulness exercises based on a weekly plan.

The control conditions, including usual care ($n=17$), standard care ($n=6$), and waitlist control ($n=1$), varied across the included studies. The contents of the controls mainly included standard pharmacological treatment, provision of information, and outpatient follow-up.

3.4. Characteristics of the Study Outcomes. Study outcomes were measured using validated scales. Self-care was measured using two different scales, including the Self-Care of Heart Failure Index (SCHFI) and European Heart Failure Self-care Behavior Scale (EHFScB). Quality of life was measured using the Minnesota Living with Heart Failure Questionnaire (MLHFQ), Kansas City Cardiomyopathy Questionnaire (KCCQ), 36-item Short-form Health Survey (SF-36), or EuroQoL Five-Dimension. Nineteen studies reported outcomes of self-care or quality of life at baseline and follow-up, and one study provided change data from baseline to follow-up [48].

3.5. Risk of Bias and Certainty of Evidence. The risk of bias assessment for the 24 studies is presented in Figure 2. Sixteen studies provided details about random sequence generation, and 13 studies provided detailed information regarding allocation concealment, indicating a low risk of selection bias. Due to the nature of the mobile health application-based intervention, it was not feasible to blind the participants and personnels; thus, all studies were rated as high risk for performance bias. Blinding of outcome assessors was not achieved in 3 studies and was not clearly described in 16 studies, leading to a high or unclear risk of detection bias. Three studies were considered to be at high risk for attrition bias because the dropout rate was more than 20%, and intention-to-treat analyses were not performed. Eight studies were considered to have an unclear risk of reporting bias due to the lack of a published or registered protocol. The certainty of the evidence ranged from very low to moderate for different outcomes (Supplementary Material Table S3). The degrading factors mainly originated from the risk of bias, considerable heterogeneity, and small sample size.

3.6. Intervention Effects

3.6.1. All-Cause Mortality. Eight studies provided data regarding all-cause mortality, and the pooled results showed that mobile health application-based interventions had no statistically significant effect on all-cause mortality (RR = 0.90, 95% CI 0.66 to 1.25, $p = 0.47$, moderate-certainty evidence; Figure 3(a) and Supplementary Material Table S3), with no evidence of heterogeneity ($I^2 = 0\%$, $p = 0.62$).

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Athilingam 2017	+	?	-	?	+	?	+
Cichosz 2020	?	+	-	?	+	+	+
Clays 2021	?	+	-	?	+	+	+
Dang 2017	?	+	-	?	+	?	+
Davoudi 2020	+	+	-	+	+	+	+
Ding 2020	+	+	-	?	+	+	+
Dorsch 2021	+	+	-	+	+	+	+
Gjeka 2021	?	?	-	-	+	?	+
Hägglund 2015	?	?	-	?	+	?	+
Jiang 2021	+	+	-	+	-	+	+
Johnson 2022	+	-	-	?	-	+	+
Kiyarosta 2020	+	+	-	?	+	+	+
Koehler 2011	+	+	-	+	+	+	+
Liu 2022	+	?	-	?	?	?	+
Pedone 2015	+	?	-	?	+	+	+
Sahlin 2022	+	+	-	?	+	+	+
Saleh 2023	+	+	-	?	+	?	+
Scherr 2009	?	?	-	?	+	?	+
Seto 2012	+	+	-	?	+	+	+
Villani 2014	+	?	-	?	+	?	+
Vuorinen 2014	?	?	-	?	+	+	+
Wita 2022	?	?	-	+	+	+	+
Wonggom 2020	+	+	-	-	+	+	+
Yanicelli 2021	+	-	-	-	-	+	+

FIGURE 2: Risk of bias summary.

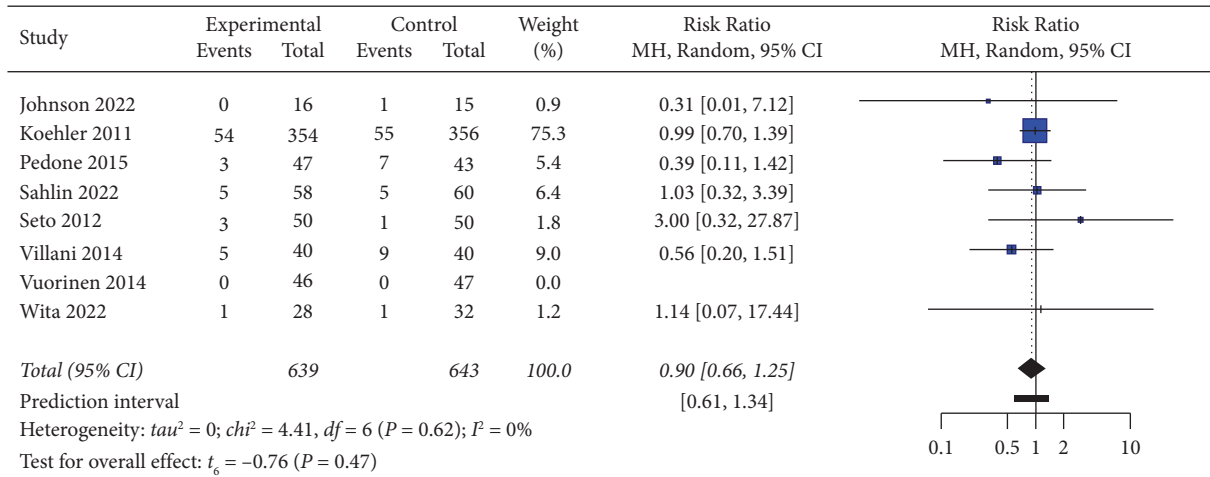
3.6.2. *Cardiovascular Mortality.* Three studies reported cardiovascular mortality as an outcome, and the pooled results showed that mobile health application-based

interventions had no statistically significant effect on cardiovascular mortality (RR=0.87, 95% CI 0.59 to 1.26, $p = 0.24$, moderate-certainty evidence; Figure 3(b) and Supplementary Material Table S3), with no evidence of heterogeneity ($I^2 = 0\%$, $p = 0.82$).

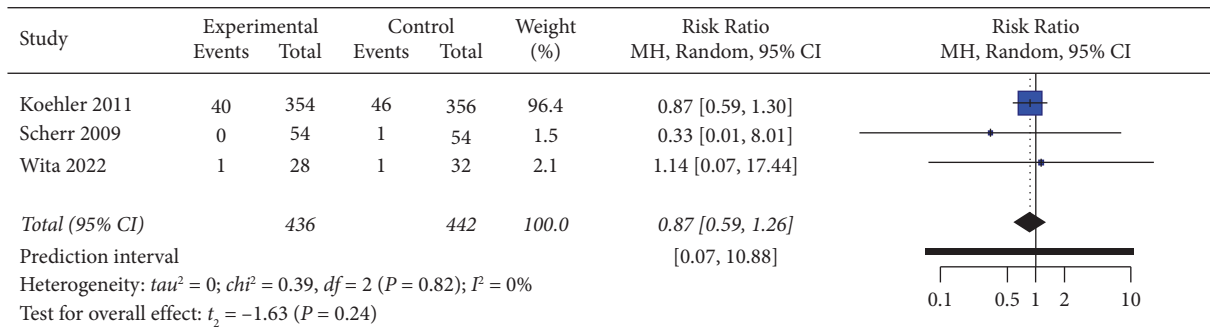
3.6.3. *All-Cause Hospitalization.* Seven studies assessed the effectiveness of mobile health application-based interventions for all-cause hospitalization, but only six studies were included in the meta-analysis. The excluded studies [39] reported the means and standard deviations instead of the numbers and percentages. The pooled results indicated that mobile health application-based interventions had no statistically significant effect on all-cause hospitalization (RR=0.74, 95% CI 0.39 to 1.42, $p = 0.29$, low-certainty evidence; Figure 3(c) and Supplementary Material Table S3), with statistically significant heterogeneity ($I^2 = 82\%$, $p < 0.01$). Seto et al. [39] reported no group differences in all-cause hospitalization.

3.6.4. *Heart Failure-Related Hospitalization.* Thirteen studies reported heart failure-related hospitalization. One study [17] was excluded from the meta-analysis because it reported the median hospitalization duration rather than the number and percentage of patients. The pooled results showed that mobile health application-based interventions significantly reduced heart failure-related hospitalization (RR=0.72, 95% CI 0.57 to 0.91, $p = 0.01$, low-certainty evidence; Figure 3(d) and Supplementary Material Table S3), with unimportant heterogeneity ($I^2 = 22\%$, $p = 0.22$). This effect size corresponds to an NNT of 14, indicating that one hospitalization from heart failure could be expectantly averted for every 14 people treated. The sensitivity analysis showed that the pooled result was not altered after removing the included studies one by one, indicating the robustness of the result.

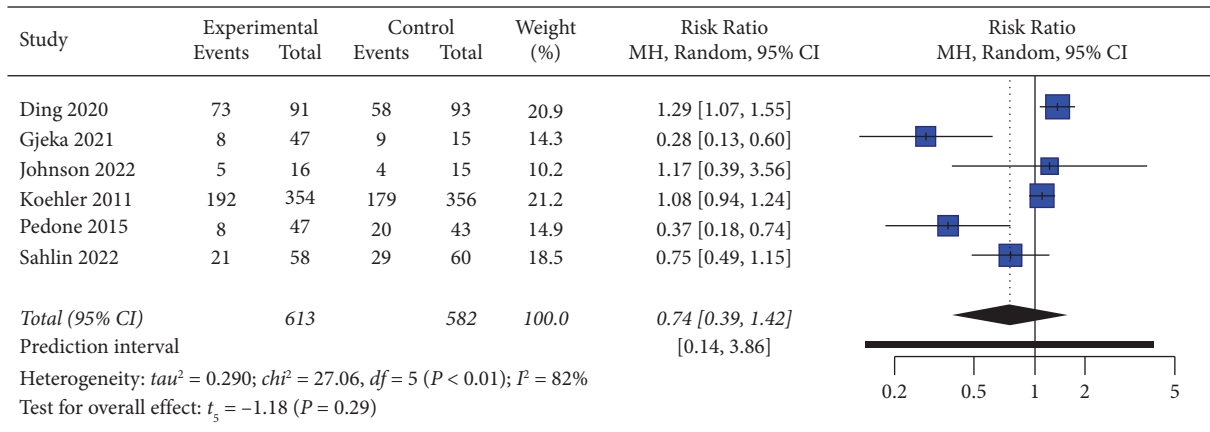
3.6.5. *Self-Care.* Twelve studies assessed the effectiveness of mobile health application-based interventions for self-care. Six studies using the SCHFI reported scores for each subscale (i.e., self-care maintenance, self-care management, and self-care confidence) instead of the total score. Six studies used EHFS_{CB} to evaluate self-care. Higher SCHFI scores represented better self-care, while higher EHFS_{CB} scores indicated worse self-care. Additionally, the score of SCHFI was commonly presented in the subdimension rather than the total score. Thus, the effectiveness of self-care was separately combined based on different tools. The pooled results demonstrated that mobile health application-based intervention had no statistically significant effect on self-care maintenance (MD = 6.04, 95% CI -3.14 to 15.21, $p = 0.15$, low-certainty evidence; Figure 4(a) and Supplementary Material Table S3), self-care management (MD = 8.94, 95% CI -6.79 to 24.66, $p = 0.19$, very low-certainty evidence; Figure 4(b) and Supplementary Material Table S3), or self-care confidence (MD = 5.29, 95% CI -5.90 to 16.48, $p = 0.28$, low-certainty evidence; Figure 4(c) and Supplementary



(a)

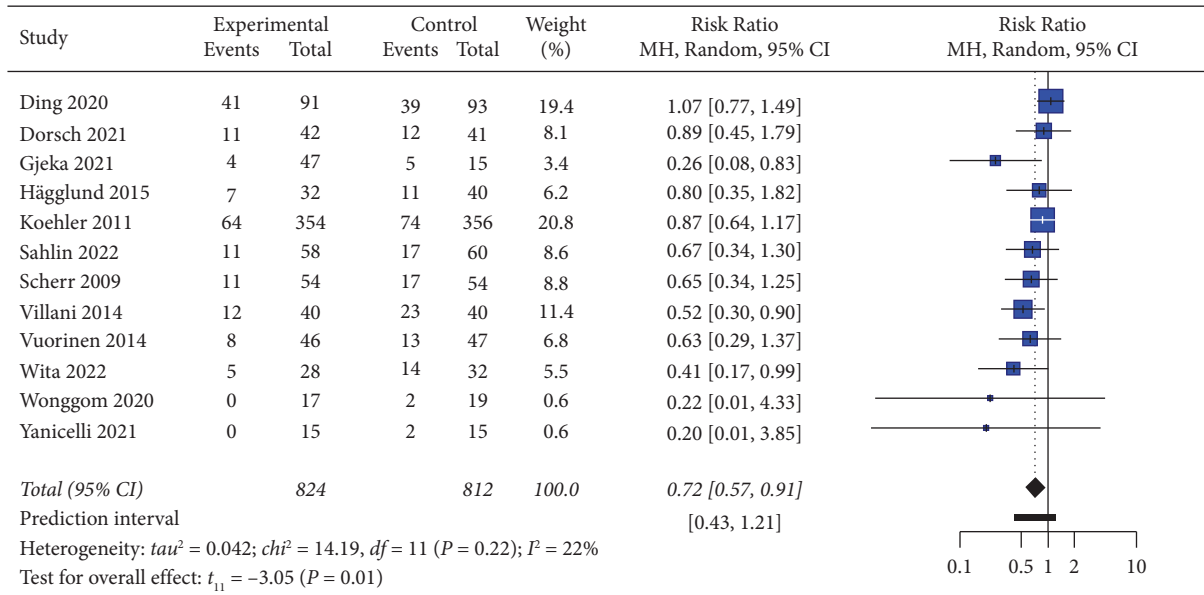


(b)



(c)

FIGURE 3: Continued.



(d)

FIGURE 3: Forest plot of the effect of mobile health application-based interventions on (a) all-cause mortality, (b) cardiovascular mortality, (c) all-cause hospitalization, and (d) heart failure-related hospitalization.

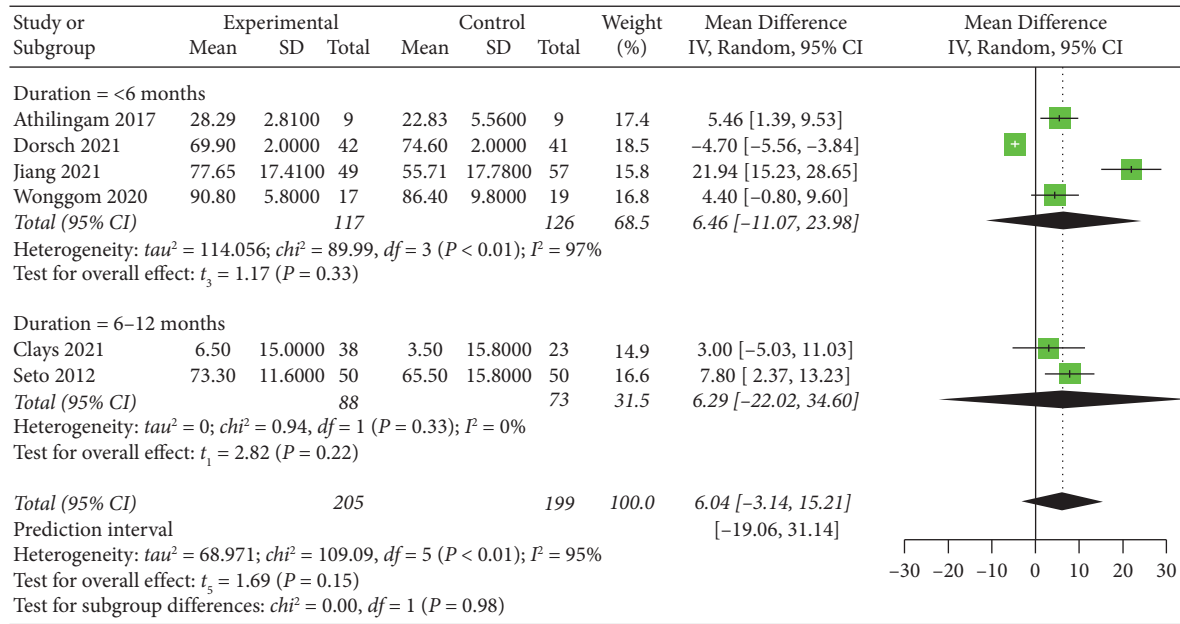
Material Table S3) when measured using the SCHFI. Furthermore, the pooled results showed no statistically significant effects on overall self-care when measured using the EHFS_{CB} (MD = -2.42, 95% CI -15.07 to 10.24, $p = 0.64$, low-certainty evidence; Figure 4(d) and Supplementary Material Table S3).

3.6.6. Quality of Life. Fourteen studies evaluated the effectiveness of mobile health application-based interventions on quality of life. Twelve studies used one tool to measure quality of life, with six using the MLHFQ, three using the KCCQ, two using the SF-36, and one using the EuroQoL Five-Dimension. Two studies used two tools (the SF-36 and MLHFQ [45] and the SF-36 and KCCQ [46]) to evaluate quality of life. For these two studies, the MLHFQ or KCCQ score were used to perform the meta-analysis instead of the SF-36 because the SF-36 score was presented subdimensionally rather than as the total score. Among the 14 studies measuring quality of life, one study [51] was excluded from the meta-analysis due to incomplete data. Because lower scores on the MLHFQ indicate better quality of life, while higher scores on other tools indicate better quality of life, the changes in quality of life using MLHFQ were recalculated in the present study using the baseline score minus the final score based on the Cochrane Handbook [28] and a previous meta-analysis [54] to obtain a consistent explanation of the scale scores. The pooled results showed that mobile health application-based interventions had a small but statistically significant effect on improving quality of life (SMD = 0.46, 95% CI 0.09 to 0.83, $p = 0.02$, low-certainty evidence; Figure 5 and Supplementary Material Table S3), with substantial heterogeneity ($I^2 = 93\%$, $p < 0.01$). The sensitivity analysis demonstrated that the pooled result was opposite

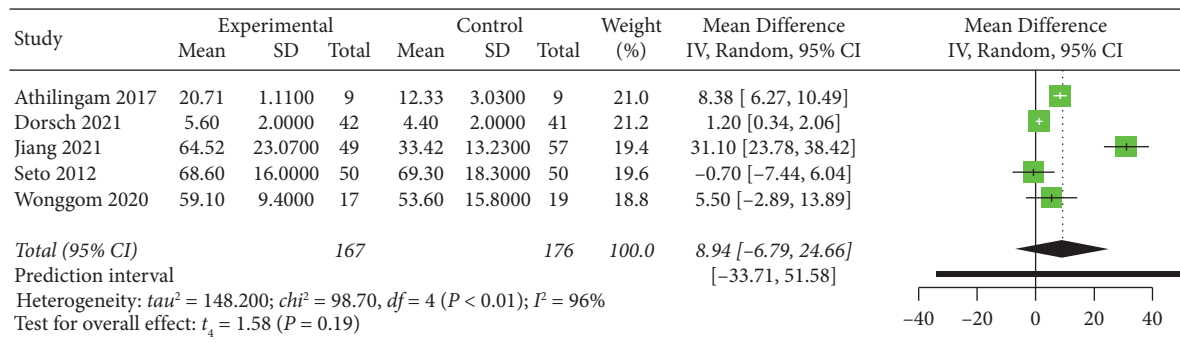
after removing the study [18], probably because the baseline quality of life in this study was lower than that in other studies.

3.6.7. Subgroup Analysis. A series of subgroup analyses were conducted based on the duration of intervention (<6 months, 6–12 months, or ≥ 12 months), mobile device (smartphone, mobile phone, or others), frequency of monitoring (daily or not daily), and delivery personnel (multidisciplinary team, not multidisciplinary team, or not specified). For the self-care subscales from the SCHFI (self-care maintenance and self-care confidence) and overall self-care from the EHFS_{CB}, the effect sizes among subgroups were similar, and no significant subgroup differences ($Q = 0.00$ – 2.83 , $p = 0.24$ – 0.98) were found except for different mobile devices for overall self-care ($Q = 8.39$, $p = 0.02$) (Figure 4 and Supplementary Material Table S4). No subgroup analysis was performed for self-care management (subscale of the SCHFI) due to the small number of studies included [55].

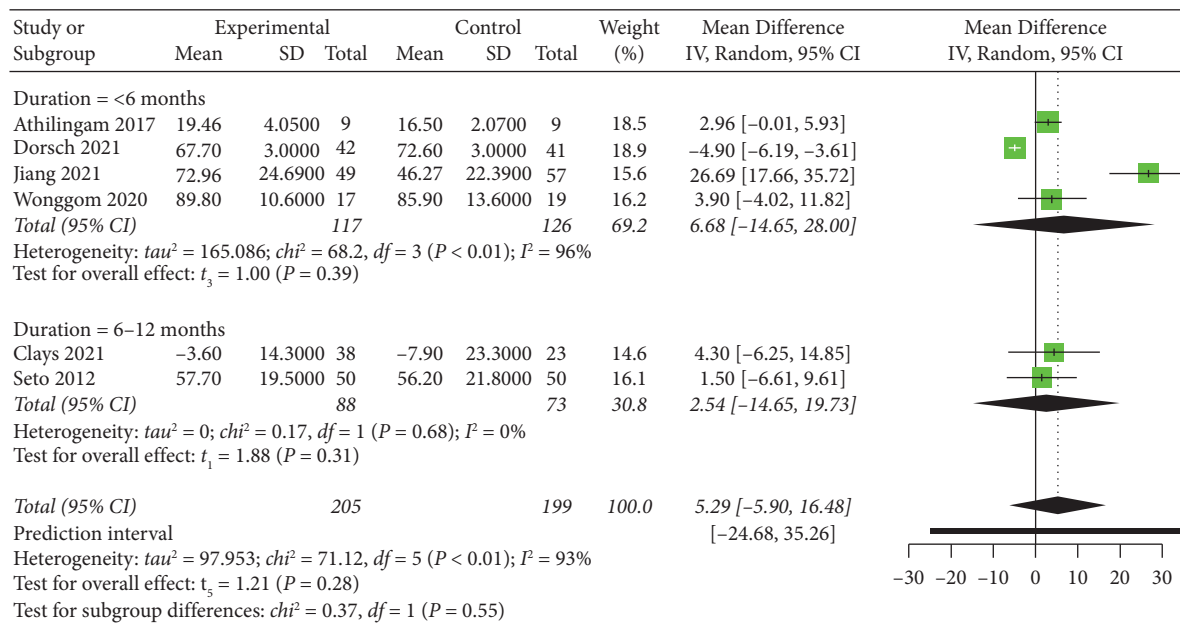
For quality of life, the results showed that mobile health application-based interventions were effective for improving quality of life when the duration of the intervention was between 6 and 12 months (SMD = 0.23, 95% CI 0.05 to 0.41, $p = 0.03$); however, no statistically significant effect occurred when the intervention duration was less than 6 months (SMD = 0.43, 95% CI -0.13 to 1.00, $p = 0.11$) or more than 12 months (SMD = 0.85, 95% CI -7.40 to 9.10, $p = 0.41$) (Figure 5). Nevertheless, the subgroup effect was not statistically significant ($Q = 1.58$, $p = 0.45$). According to the subgroup analysis of the frequency of monitoring, mobile health application-based interventions had a significant effect on quality of life when physiological data were



(a)

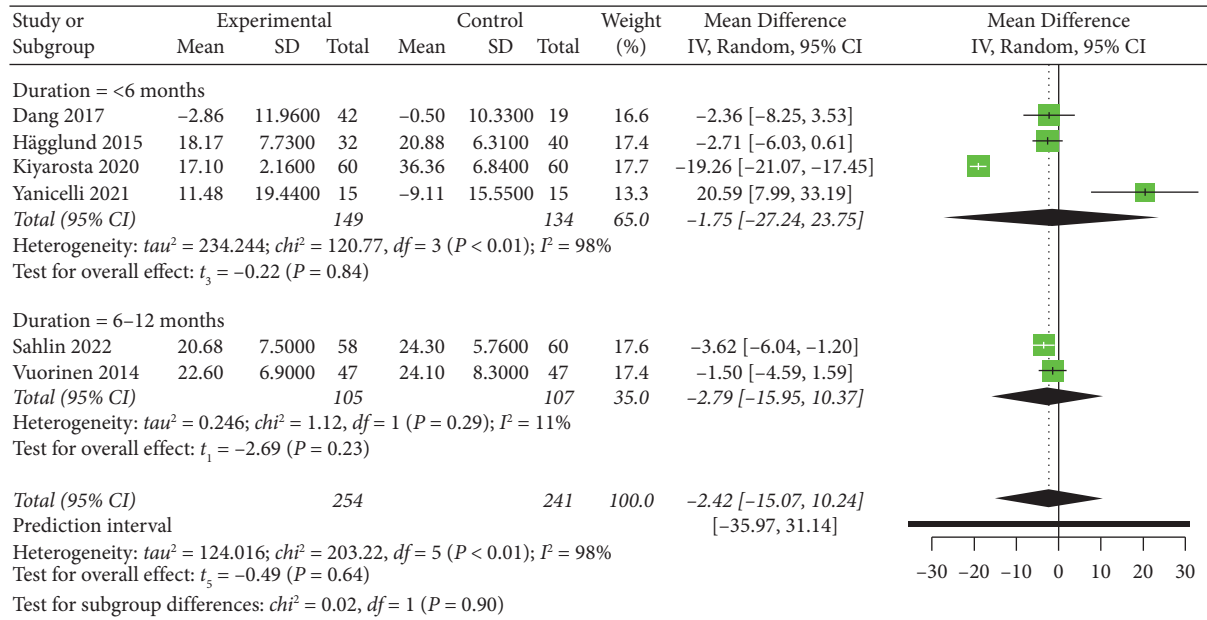


(b)



(c)

FIGURE 4: Continued.



(d)

FIGURE 4: Forest plot of the effect of mobile health application-based interventions on (a) self-care maintenance, (b) self-care management, (c) self-care confidence, and (d) overall self-care.

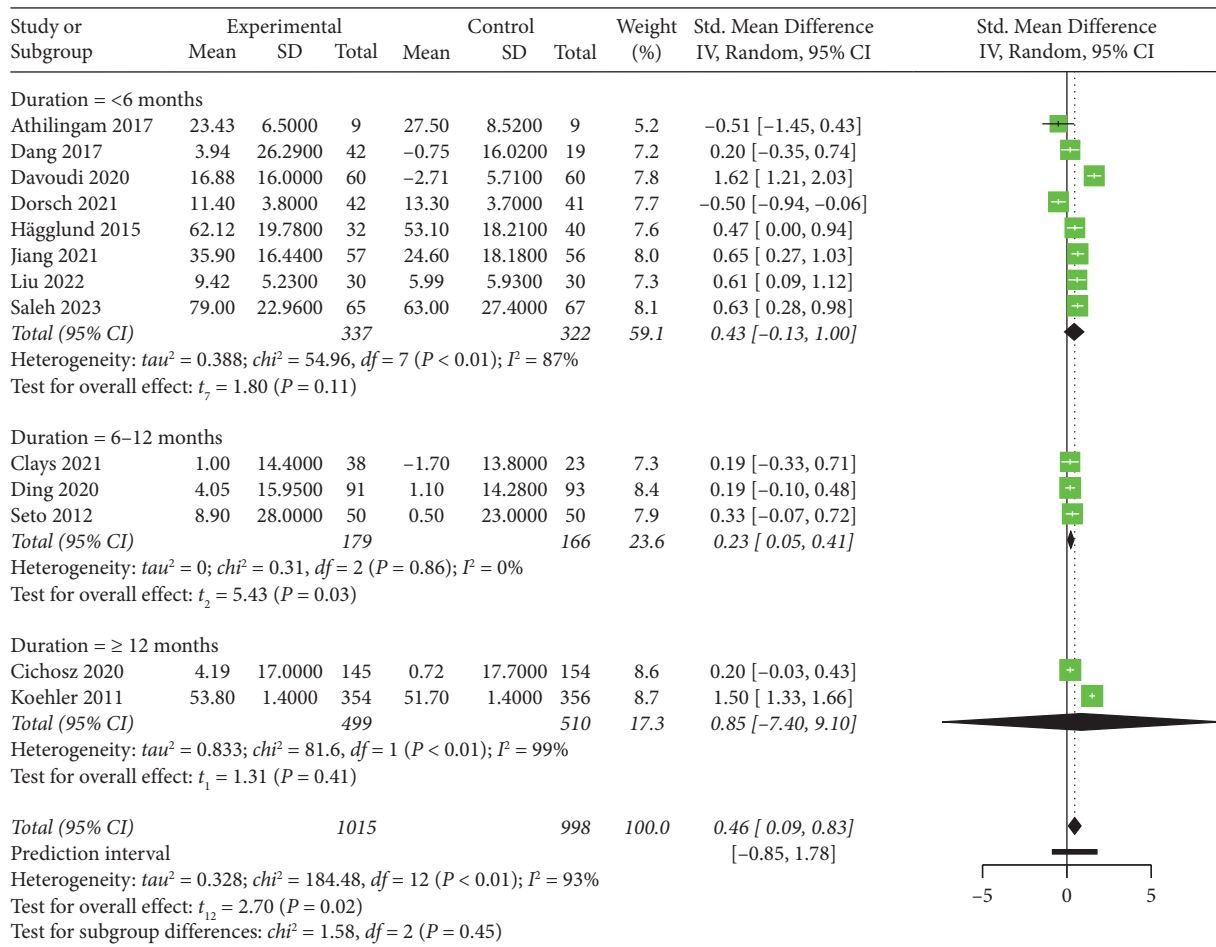


FIGURE 5: Forest plot of the effect of mobile health application-based interventions on quality of life.

monitored daily (SMD = 0.47, 95% CI 0.02 to 0.92, $p = 0.04$); however, no statistically significant effect was found when physiological data were not monitored daily (SMD = 0.40, 95% CI -2.26 to 3.05, $p = 0.31$) (Supplementary Material Table S4). No subgroup differences were detected ($Q = 0.06$, $p = 0.80$).

3.6.8. Publication Bias. Egger's regression intercept indicated that publication bias in quality of life was not statistically significant ($p = 0.054$). However, publication bias was found for heart failure-related hospitalization according to Egger's regression intercept ($p = 0.004$). Funnel plots of heart failure-related hospitalization and quality of life are presented in Supplementary Material Figures S1 and S2, respectively. Funnel plots for all-cause mortality, cardiovascular mortality, all-cause hospitalization, and self-care were not generated due to the small number of studies [28].

4. Discussion

This systematic review and meta-analysis summarized evidence from 24 studies involving 2886 participants to identify the effects of mobile health application-based interventions among people with heart failure. The pooled results showed that mobile health application-based interventions had beneficial effects on reducing heart failure-related hospitalization and improving quality of life but had no statistically significant effect on all-cause mortality, cardiovascular mortality, all-cause hospitalization, or self-care.

The results indicated that application-based interventions could not reduce mortality or all-cause hospitalization. These findings are consistent with previous reviews [26], which revealed no statistically significant positive effect of mobile telemonitoring applications on mortality in people with heart failure. Similarly, a review focused on mobile phone-based interventions for managing heart failure revealed that such interventions were not effective at reducing all-cause mortality or all-cause hospitalization [22]. One possible reason could be that almost all interventions included in this review monitored indices specific to heart failure (e.g., weight and heart failure symptoms), which may limit the possibility of identifying exacerbations related to other chronic conditions (e.g., diabetes and chronic obstructive pulmonary disease) and other cardiovascular diseases (e.g., ventricular arrhythmias) [21]. Another possible explanation is that more than half of the participants were older adults who had a high risk of comorbidity [56], prompting hospitalization because of another disease instead of heart failure.

The findings suggested that the application-based interventions may have benefits for reducing heart failure-related hospitalization, which was in line with the findings of a previous study [49]. Most of the included studies in this review had the feature of self-monitoring and feedback. Self-monitoring of physiological data (e.g., weight, blood pressure, and heart rate) and heart failure symptoms allows healthcare providers to track patients' health information and provide timely suggestions and knowledge about disease

[49, 50], which helps patients take early action to delay the worsening of heart failure, resulting in decreased failure-related hospitalization. However, these findings should be interpreted with caution. First, the certainty of evidence was low, and the included studies had varied risks of bias. Second, publication bias was detected for the outcome of heart failure-related hospitalization, which may overestimate the effectiveness of application-based interventions.

The results of the meta-analysis indicated that the effects of application-based interventions on self-care were not observed, whether measured with the SCHFI or EHFScB. These findings are supported by those of Wonggom et al. [19], who reported that the use of application-based interventions had no statistically significant effect on self-care maintenance or self-care confidence. However, these findings were inconsistent with those of a previous review by Zhang et al. [57]. A possible explanation for this difference is that nearly half of the included studies in this review did not provide additional health education resources, which may have limited the improvement of heart failure-related knowledge and skills and was less likely to cause statistically significant impacts on self-care. Nevertheless, almost all the included studies in Zhang et al.'s [57] review provided self-management guidance for chronic heart failure, resulting in improved self-care. Hence, our results suggest that health education can be embedded in applications in addition to tele-monitoring features and offers much more visual and vivid education, for example, videos, questions and answer games [50]. In addition, the studies included in this review rarely used empowerment strategies or behavior change theories, which may have resulted in a nonsignificant effect on self-care behavior in the present review, as incorporating empowerment strategies and behavior change theories into interventions is more effective than not incorporating such strategies [58]. Therefore, future studies should be developed based on empowerment strategies and behavior change theories.

Despite the apparent heterogeneity, this review revealed a statistically significant effect of mobile health application-based interventions on improving quality of life. Similarly, Zhang et al. [57] reported that electronic health interventions, such as application-based interventions, effectively increase quality of life in people with chronic heart failure. However, our findings are inconsistent with those of Son et al. [22] and Kitsiou et al. [21]. These differences may be because previous reviews included various mobile health technologies, such as voice call interventions and short message services, while the current review limited the intervention to mobile applications. Moreover, the most frequent intervention was voice calls in Son et al.'s study, which lacked an interface for telemonitoring interactions [26]. Self-monitoring, reminders, and feedback were the common features of our included studies; these features make it easy for patients to receive immediate support from healthcare professionals, eventually leading to improved quality of life. Subgroup analysis revealed that the effect on quality of life was observed when patients received mobile health application-based interventions for 6–12 months or when self-monitoring was conducted daily. However, the subgroup effect was not statistically significant, which might

be due to uneven distributions of studies and participants across subgroups [59]. This result should be interpreted with caution because of the small number of long-term studies (two to three trials), the heterogeneity of the interventions, and the low certainty of the evidence. Hence, further rigorous trials are warranted to draw highly robust conclusions.

Notably, when delivering mobile health application-based interventions for people with heart failure, the acceptance and simplicity of use of the applications need to be considered [60], especially for elderly patients and people with limited digital literacy [61]. The characteristics of applications may reduce patient engagement and increase the attrition rate, which in turn affects intervention effectiveness [61].

4.1. Limitations. This systematic review has several limitations. First, the methodological qualities of the included studies were not optimal, and all studies showed performance bias due to the nature of the interventions. Second, there was substantial heterogeneity between studies due to differences in sample sizes, intervention characteristics (e.g., application features, duration and frequency of monitoring), participant characteristics, and assessment tools. Therefore, the results of the current study must be interpreted with caution. Third, the included studies were mostly conducted in developed countries, which may limit the generalizability of our results. Fourth, only English-language studies were included, which may result in possible publication bias. Finally, cautions should be taken when using the evidence, as the overall GRADE evidence was very low to moderate.

4.2. Implications. This systematic review provides a quantitative synthesis of the effects of mobile health application-based interventions on mortality, hospitalization, self-care, and quality of life. The findings suggest that the use of mobile health application-based interventions can be considered a useful strategy for managing heart failure. Given the prevalence of smartphone ownership [62], mobile applications are a viable option for patients to obtain medical suggestions and support. Existing studies that involve application-based interventions differ in terms of delivery devices, personnel, key features of the application, durations, and outcome measures [18, 20]. Therefore, the optimal component of mobile health application-based interventions should be examined in the future based on patient characteristics and multicultural contexts. Only eight out of 24 studies used empowerment strategies and behavior change theories. Hence, additional theory-guided trials are warranted to determine the impact of mobile health application-based interventions on self-care. Due to the complexity of heart failure, a multidisciplinary team is recommended for delivery application-based interventions.

5. Conclusions

This systematic review and meta-analysis showed that mobile health application-based interventions are effective at reducing heart failure-related hospitalization and improving quality of life. Evidence was not conclusive for

mortality, self-care, and all-cause hospitalization. The effects on quality of life may vary among the different durations of the interventions and frequency of monitoring. Hence, well-designed randomized controlled trials are needed to explore the optimal duration of intervention and strengthen the current evidence.

Data Availability

The data used to support the findings of this study are available from the corresponding authors upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Supplementary Materials

Table S1: Search strategy. Table S2: Characteristics of the included studies. Table S3: GRADE certainty grading evaluation. Table S4: Subgroup analyses of mobile health application-based interventions on self-care and quality of life. Figure S1: Funnel plots of heart failure-related hospitalization. Figure S2: Funnel plots of quality of life. (*Supplementary Materials*)

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Research Article

Moral Distress, Burnout, Turnover Intention, and Coping Strategies among Korean Nurses during the Late Stage of the COVID-19 Pandemic: A Mixed-Method Study

Jae Jun Lee ¹, Hyunju Ji ², Sanga Lee ³, Seung Eun Lee ⁴, and Allison Squires ⁵

¹Department of Nursing, Graduate School, Yonsei University and Severance Hospital, Seoul 03722, Republic of Korea

²Severance Hospital, Yonsei University Health System, Seoul 03722, Republic of Korea

³Manning College of Nursing and Health Sciences, University of Massachusetts Boston, Boston, MA 02125, USA

⁴Mo-Im KIM Nursing Research Institute, College of Nursing, Yonsei University, Seoul 03722, Republic of Korea

⁵Rory Meyers College of Nursing, New York University, New York, NY 10010, USA

Correspondence should be addressed to Seung Eun Lee; leese@yuhs.ac

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The COVID-19 pandemic has exacerbated the difficulties nurses face, resulting in higher turnover rates and workforce shortages. This study investigated the relationships between nurses' moral distress, burnout, and turnover intention during the last stage of the COVID-19 pandemic. It also explored the coping strategies nurses use to mitigate moral distress. Utilizing a mixed-method approach, this study analyzed data from 307 nurses caring for patients with COVID-19 in acute care hospitals through an online survey conducted in November 2022. Our data analysis encompassed quantitative methods, including descriptive statistics and path analysis, using a generalized structural equation model. For the qualitative aspect, we examined open-ended responses from 246 nurses using inductive content analysis. The quantitative findings revealed that nurses' moral distress had a significant direct effect on turnover intention. In addition, burnout significantly mediated the relationship between moral distress and turnover intention. Qualitative analyses contextualized the relationships uncovered in the quantitative analyses. The qualitative analysis identified various positive and negative coping strategies. Positive strategies included a commitment to minimize COVID-19 transmission risks, adopting a holistic approach amidst the challenges posed by the pandemic, voicing concerns for patient safety, engaging in continuous learning, and prioritizing self-care. Conversely, negative strategies involved adopting avoidance behaviors stemming from feelings of powerlessness and adopting a passive approach to one's role. Notably, some participants shifted from positive to negative coping strategies because of institutional barriers and challenges. The findings underscore the importance for hospital administrators and nurse managers to acknowledge the impact of the pandemic-related challenges encountered by nurses and recognize the link among moral distress, burnout, and turnover intention. It highlights the essential role of organizational and managerial support in fostering effective coping strategies among nurses to address moral distress.

1. Introduction

The COVID-19 pandemic has significantly heightened the challenges faced by nurses, resulting in increased turnover rates and looming concerns about workforce shortages [1, 2]. The Organisation for Economic Co-operation and Development reported that a substantial number of nurses considered leaving their positions during and after the pandemic [3]. Furthermore, the International Council of

Nurses predicted a global shortage of up to 130,000 nurses, largely due to the pandemic [4]. Understanding the factors driving nurses' turnover intention is crucial to curtail these shortages. Traditional factors influencing nurse turnover include unfavorable work environments, unsupportive organizational cultures, high work demands, and insufficient social support [5, 6]. However, the pandemic has introduced novel concerns, such as COVID-19 fear, safety inadequacies, direct patient care challenges, personal infection risks, and

moral distress [7]. Furthermore, moral distress, driven by pandemic-specific ethical dilemmas, has played a central role in nurses' contemplation of leaving their positions or professions.

Moral distress is an emotional reaction that arises when individuals are unable to act ethically owing to external constraints [8]. The global COVID-19 pandemic presented nurses with myriad of challenges, intensifying their experience of moral distress [9, 10]. Amid the pandemic, nurses were required to shoulder dual responsibilities—attending to basic patient needs and delivering specialized nursing care, especially as isolated COVID-19 patients lacked dedicated caregivers [10, 11]. The scarcity of personal protective equipment (PPE) endangered the direct care of COVID-19 patients [9]. These collective challenges heightened nurses' moral distress during the pandemic [9, 10, 12], fuelling their intention to depart from their nursing roles [7]. Previous research has identified the experience of moral distress among nurses during the COVID-19 pandemic as a significant contributor to turnover intention among nurses in Romania [13] and the US [14].

While previous studies have emphasized the impact of moral distress on nurses' intentions to leave [13–16], the underlying mechanisms explaining its nature remain ambiguous. Consistent findings suggest a correlation between chronic moral distress and the development of burnout [17, 18]. Facing recurring ethically distressing situations can result in nurses experiencing burnout symptoms such as exhaustion, cynicism, and decreased self-efficacy [19]. Exhaustion often stems from overwhelming workloads and when combined with perceptions of unfairness and a lack of rewards, a cynical perspective can develop [20]. Cynicism, which refers to psychological withdrawal from work, directly increases the propensity for turnover intention [20]. Given that the pandemic exacerbated moral distress through the intensified workloads and situations that undermined patients' quality of care and healthcare professionals' safety [10, 12, 18], it is plausible that this could precipitate burnout [17, 18]. Thus, we postulated that burnout could be a mediating factor in the relationship between moral distress and nurses' turnover intention.

Given the importance of moral distress on nurses' turnover intention, several studies have explored coping techniques. Most recommendations have focused on addressing the symptoms of moral distress through activities such as meditation, ensuring adequate sleep, listening to music [21], personal reflection, and informal conversations with colleagues [10, 22, 23]. However, these self-care strategies often align more with alleviating post-traumatic stress disorder symptoms than moral distress [24] and limited evidence supports their effectiveness in the context of moral distress. Furthermore, emphasizing these coping techniques may inadvertently frame moral distress as a challenge for individuals, implying that personal resilience is the primary solution. Considering the unique pressures of the COVID-19 pandemic, nurses might have utilized alternative coping strategies beyond the standard self-care approaches highlighted in prior studies. However, the strategies that nurses could have embraced to counteract

moral distress during the pandemic remain underexplored, underscoring a critical gap in understanding and clarifying the need for further investigation into this area.

This study had the following three primary objectives: (1) to examine the relationship between moral distress and nurses' turnover intention; (2) to investigate whether burnout mediated this relationship; and (3) to identify the coping strategies employed by nurses to mitigate moral distress in the Korean healthcare context.

2. Materials and Methods

2.1. Study Design. This study used a concurrent mixed-methods design. Using an online survey, quantitative and qualitative data were simultaneously collected. This study was conducted as a part of the Global Consortium of Nursing and Midwifery Study, a multinational research consortium comprising 75 countries. For this study, we focused exclusively on data collected from Korean nurses, as only Korean dataset included items on moral distress.

2.2. Participants. Nurses who provided direct care to COVID-19 inpatients in acute care hospitals were invited to participate. Nurses with managerial roles were excluded because they do not provide direct care to patients in Korean hospitals. A total of 310 nurses completed the online survey, but data from three participants were excluded because they responded to all survey items with the same option number. Therefore, data from 307 nurses were analyzed. The ideal sample size for path analysis was at least 20 participants per variable [25]. Given that our study utilizes eight variables in path analysis, a minimum of 160 participants is required to ensure adequate statistical power and reliability of the results. Therefore, the sample size was deemed sufficient for this study.

2.3. Data Collection. In November 2022, data were collected from two Korean hospitals that experienced a significant influx of COVID-19 patient admissions. We collaborated with the nursing department of each hospital to facilitate participant recruitment. The nursing departments assisted in sending invitation emails containing secure links to an online survey, specifically to nurses caring for COVID-19 patients. Given that in Korea, only specific hospitals were designated as COVID-19 hospitals with designated isolation beds to contain the spread of the virus [26], we employed a snowball sampling method to augment our sample size and ensure its adequacy.

2.4. Measurements

2.4.1. Demographic Characteristics. Participants' demographic information, including age, gender, educational level, hospital tenure, and monthly income, was collected.

2.4.2. Moral Distress. Moral distress was measured using the COVID-19 Moral Distress Scale (COVID-MDS) [27]. The scale comprises 12 items across the following three domains:

team/system (six items), patient (three items), and COVID-19 (three items). These domains capture the various sources of moral distress that nurses may experience while caring for COVID-19 patients [27].

After receiving approval from the original tool developers, the instrument was translated into Korean, following the translation guidelines of the Agency for Healthcare Research and Quality [28]. First, two bilingual nurses translated the scale into Korean. Subsequently, a nursing professor and three nurses with more than five years of nursing experience reviewed the translated items for their accuracy and appropriateness. A panel of five experts independently rated the relevance and accuracy of the translated items. The standard four-point Content Validity Index (CVI) rating scale, from 1 (not relevant) to 4 (highly relevant), was used to evaluate the conceptual relevance of each item, and the accuracy of the translation was answered as either yes or no [29]. Modified kappa statistics, which adjusted for chance agreement for CVI, were used to assess the relevance and accuracy of the translation [30]. The item-level CVI (I-CVI) for relevance was 1.0 for all 12 items. The modified kappa and the translation I-CVI (TI-CVI) were 0.76–1.0 and 0.80–1.0, respectively, indicating that the COVID-MDS is relevant for measuring moral distress in Korean nurse population [30]. Based on the results of the cognitive interviews with six nurses, the instrument was further refined and finalized. Subsequently, a confirmatory factor analysis (CFA) was performed on the data from 307 participants, and the results supported the three-factor model of the COVID-MDS. The CFA fit indices yielded favorable results, with a χ^2 (51) of 62.96, root mean square error of approximation of 0.03, standardized root mean square residual of 0.06, comparative fit index of 0.99, and Tucker–Lewis index of 0.99.

In line with the instructions provided by the tool developers [27], each item on the COVID-MDS was scored by multiplying the frequency ranging from 0 (never) to 3 (often) and the intensity ranging from 0 (no distress) to 3 (severe distress). This calculation yielded item scores ranging from 0 to 9. The total COVID-MDS score was calculated as the mean value for all the items' scores, with a higher value indicating a higher moral distress. The Cronbach's alpha value was 0.90 in the original study of the instrument [27] and the value was 0.90 in the present study.

2.4.3. Burnout. Burnout was assessed using a single-item measure adapted from the Mini-Z Instrument, developed by Linzer et al. [31]. This measure has been validated against the Maslach Burnout Inventory [32], indicating good validity [31]. Responses were scored on a 5-point scale ranging from 1 (no symptoms of burnout) to 5 (completely burned out). Consistent with previous studies [33], scores over 2 were considered indicative of burnout.

2.4.4. Turnover Intention. Turnover intention was measured using a single-item question that asked nurses whether they were considering leaving their current job within the next year. The response options provided were no, maybe, or yes.

In line with previous research [34], we recategorized the responses as a binary variable as follows: 0 (no turnover intention) and 1 (turnover intention, including those who answered either maybe or yes).

2.4.5. Strategies to Mitigate Moral Distress. Participants were asked to answer an open-ended question regarding the strategies they employed to alleviate moral distress while caring for COVID-19 patients. The question was presented as a free-text response, allowing the participants to provide as much detail as they wished. Since online surveys that incorporated open-ended questions were shown to be a suitable method for collecting qualitative data during the COVID-19 pandemic given their flexibility and accessibility [11], we utilized this method.

2.5. Ethical Considerations. This study received ethical approval from the Institutional Review Board of Yonsei University Health System (#4-2022-0675). The online survey introduction page provided participants with information about the purpose of the study, eligibility criteria, study duration, and the estimated time required to complete the survey. Participation in the study was voluntary, and participants had the freedom to withdraw at any point without any consequences. Written informed consent was adapted to the online format of our survey. At the beginning of the survey, participants encountered mandatory consent checkboxes. By selecting these checkboxes, participants indicated their informed consent to participate in this study. As a token of appreciation for their participation, all participants were offered a gift card worth approximately US\$12.

2.6. Data Analysis. For the quantitative data, descriptive statistics were employed to examine the sample characteristics and key study variables. Path analysis was conducted using generalized structural equation modeling (GSEM), controlling for covariates, to investigate the mediating effect of burnout on the relationship between moral distress and turnover intention. Given that GSEM is suitable for path analyses involving binary variables [35], we chose this analytical method because burnout and turnover intention are binary variables. Bootstrapping based on 5,000 replications was performed to test the significance of direct and indirect effects [36]. All statistical analyses were performed using STATA 16.0 with the statistical significance level set at 0.05.

For the qualitative data analysis, we adopted the inductive content analysis method proposed by Graneheim and Lundman [37]. Of the 307 survey participants, 246 responded to the open-ended questions, yielding a dataset of free-text data from 246 participants. The analysis was conducted by three trained coders, who engaged in iterative discussions to address any discrepancies and ensure consistency in the coding process. Prior to commencing the analysis, all coders thoroughly familiarized themselves with the participants' responses by carefully reading through the data. In total, 344 meaning units were identified from the

responses. Subsequently, the coders condensed the meaning units and independently assigned codes to them. Through ongoing discussions and comparison of coding outcomes, any discrepancies in coding were resolved through consensus among the coders. Similar codes were grouped into subcategories, which were then merged to form major categories. This meticulous process was employed to uphold the rigor and quality of the data analysis, ensuring reliability and validity of the findings.

3. Results

3.1. Description of the Participants. A total of 307 nurses who had cared for COVID-19 patients participated in this study. The majority of participants ($n = 289$, 94.1%) were female, with an average age of 32.1 (SD = 6.5) years. Most participants held a bachelor's degree ($n = 245$, 79.8%) and their mean length of hospital tenure was 89.4 (SD = 66.2) months. More than half of the participants ($n = 174$, 56.7%) reported experiencing burnout, and 41.4% ($n = 127$) reported an intention to leave their current jobs (Table 1).

3.2. Moral Distress. Table 2 illustrates the scores for the moral distress subdomains and the summary scores. The summary score of moral distress was 3.0 (SD = 1.8), with the COVID-19 domain (mean = 3.3, SD = 2.3) exhibiting the highest score among the three domains. Nurses reported experiencing the highest levels of moral distress when assigned an unsafe number of patients. This was followed by caring for COVID-19 patients who presented with a transmission risk and caring for patients who had to be hospitalized without their family members.

3.3. The Relationships between Moral Distress, Burnout, and Turnover Intention. Figure 1 illustrates the associations between moral distress and turnover intention through burnout, while accounting for participants' age, gender, educational level, hospital tenure, and monthly income. Moral distress was positively associated with burnout (coefficient = 0.30, $p < 0.001$) and turnover intention (coefficient = 0.15, $p < 0.01$). Burnout was significantly related to turnover intention (coefficient = 1.28, $p < 0.001$). In addition, burnout significantly mediated the relationship between moral distress and turnover intention (OR = 1.47, 95% bias-corrected CI = 1.13–1.92).

3.4. Coping Strategies to Mitigate Moral Distress. The qualitative data analysis yielded three main categories and eight subcategories regarding nurses' moral distress coping strategies (Table 3). The three main categories were positive, negative, and shifting from positive to negative coping strategies. The first category, positive-coping strategies, encompasses five subcategories that highlighted the proactive strategies employed by nurses to address moral distress and foster personal growth. The second category, negative-coping strategies, consisted of two subcategories that clarified the passive and negative ways in which nurses

TABLE 1: General characteristics of the study participants ($N = 307$).

Variables	Mean (SD)	n (%)
Age (years)	32.1 (6.5)	
Gender		
Male		18 (5.9)
Female		289 (94.1)
Educational level		
Associate's degree		38 (12.4)
Bachelor's degree		245 (79.8)
Master's degree		24 (7.8)
Hospital tenure (months)	89.4 (66.2)	
Monthly income (10,000 Korean won)	379.9 (94.4)	
Burnout		
Yes		174 (56.7)
No		133 (43.3)
Turnover intention		
Yes		127 (41.4)
No		180 (58.6)

Note. SD: standard deviation.

coped with moral distress. The third category, shifting from positive to negative coping strategies, describes how some nurses initially utilized positive coping strategies, but subsequently shifted towards negative ones.

3.4.1. Positive-Coping Strategies

(1) Being Committed to Minimizing COVID-19 Transmission Risks. Nurses adhered to stringent protocols and measures to alleviate moral distress stemming from the potential transmission risks inherent in caring for COVID-19 patients. They strictly adhered to institutional policies by properly wearing PPE and actively adhering to the quarantine guidelines. The participants strictly prohibited contact between patients to prevent transmission and took precautions to avoid personal contamination.

"I strictly followed the quarantine guidelines to ensure both our patients and we remained shielded from infection." (P57)

"I've been trying my best to prevent virus transmission and avoid contamination." (P179)

(2) Adopting a Holistic Approach Amidst COVID-19 Challenges. Several nurses stated that they tried to provide more comprehensive care for their patients by meeting patients' needs, focusing on patient education, and referring to patients' relevant resources to mitigate their moral distress. Participants noted that they attempted to provide nursing care that addressed the unique needs of each patient. Some participants stated that they carefully assessed each patient's symptoms and focused on the fundamental nursing care that they might not usually provide, such as oral hygiene and eye care. Notably, COVID-19 patients experienced isolation without the presence of family caregivers, and nurses took on the responsibility of frequently monitoring and assisting patients with their personal hygiene and safety. Many

TABLE 2: COVID-19-related moral distress.

Domain	Frequency Mean (SD)	Intensity Mean (SD)	Multiplied score Mean (SD)
Patient domain	1.4 (0.9)	1.4 (1.0)	2.4 (2.0)
Being asked to provide and continue aggressive and potentially futile treatments when I believe it is not in the best interest of the patient	1.6 (0.8)	1.5 (1.0)	2.7 (2.5)
Witnessing orders for unnecessary or inappropriate care that do not adequately address patient needs	1.2 (0.8)	1.2 (1.0)	2.0 (2.3)
Providing care to patients who have not been adequately informed or included in decisions regarding their own care	1.5 (0.9)	1.4 (1.0)	2.6 (2.4)
Team/system domain	1.7 (0.9)	1.5 (1.0)	3.1 (2.0)
Experiencing poor communication between members of the care team that adversely affects patient care	1.7 (0.7)	1.6 (0.9)	3.0 (2.4)
Being assigned an unsafe number of patients to care for at once considering the acuity level for each patient assigned to me	2.1 (0.8)	1.9 (0.9)	4.4 (3.0)
Attempting to deliver a high standard of care with limited time, supplies, and resources	1.7 (0.9)	1.5 (1.0)	3.1 (2.8)
Using technology and documentation that burdens me and compromises patient care	1.6 (0.8)	1.5 (0.9)	2.8 (2.5)
Witnessing or experiencing uncivil behavior among members of the care team	1.8 (0.9)	1.6 (1.0)	3.2 (2.9)
Witnessing a lack of respect among the healthcare team for patients from vulnerable populations or minority groups	1.1 (0.9)	1.1 (1.1)	1.8 (2.3)
COVID-19 domain	1.8 (0.9)	1.5 (1.0)	3.3 (2.3)
Caring for patients who must experience hospitalization without family presence	2.1 (0.8)	1.6 (0.9)	3.7 (2.7)
Caring for patients who die during a hospitalization without family and/or clergy present	1.3 (1.0)	1.3 (1.1)	2.4 (2.7)
Caring for COVID-19 patients that presents a transmission risk to you or your family/household	2.0 (0.9)	1.7 (1.0)	3.8 (2.9)
Summary score	1.6 (0.9)	1.5 (1.0)	3.0 (1.8)

Note. SD: standard deviation.

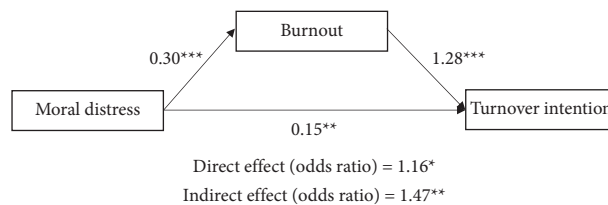


FIGURE 1: Results of path analysis using generalized structural equation modelling. Age, gender, educational level, hospital tenure, and monthly income were adjusted for in the model, and results were bootstrapped with 5,000 repetitions. The unstandardized coefficients were used to express the correlation between variables. The direct and indirect effects are presented as odds ratios at the bottom of the figure. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE 3: Coping strategies to mitigate moral distress.

Categories	Subcategories
Positive-coping strategies	Being committed to minimizing COVID-19 transmission risks
	Adopting a holistic approach amidst COVID-19 challenges
	Voicing concerns for patient safety
	Continuous learning
	Engaging in self-care
Negative-coping strategies	Adopting avoidance behaviors due to feelings of powerlessness Becoming passive in one's role
Shifting from positive- to negative-coping strategies	—

respondents also stated that they educated or counseled patients and their family members frequently to help enhance their understanding of their health status and the

treatment journey. One nurse shared her practice of providing daily briefings to patients to ensure that they were informed about their treatment progress. Another nurse

shared that when patients decided whether to continue life-sustaining treatment, she explained the details of each treatment to help them make informed decisions. In addition, some nurses actively directed patients to resources, connecting those with financial constraints to hospital aid programs or even seeking extra assistance for their patients who could not afford necessary treatments.

"I completed other tasks as quickly as possible and devoted time to basic nursing care for patients, including position change, oral care, eye care, and lung care." (P279)

"I made an effort to explain both the current physical condition and the purposes of treatments to patients. I aimed to briefly summarize the patients' progress of each day and share any improvements with them and their caregivers." (P124)

"When a patient refused treatment due to financial constraints, I sought ways to assist the patient." (P59)

(3) *Voicing Concerns for Patient Safety.* Nurses noted that they advocated for patient safety by voicing their concerns to supervisors or physicians to alleviate their moral distress. They proactively approached their supervisors, urging an increase in the number of nurses assigned to units to enhance the quality of nursing care. These nurses recognized the detrimental effects of nursing shortages on patient outcomes and emphasized the importance of adequate staffing to maintain high-quality care. In addition, nurses took it upon themselves to clarify and question physicians' orders that appeared inappropriate or lacked sufficient evidence supporting their effectiveness. They recommended alternative approaches and advocated for better decision-making to ensure their patients' best interests. One nurse saw a patient suffer immensely from an unnecessary and improper prescription and spoke to both a resident and attending physician, urging a change in prescription practices.

"I asked my manager to increase the number of nurses working in our department to ensure our patients received safer care." (P167)

"The most harrowing experience for me was witnessing a cancer patient, already terminally ill, die without dignity. Despite his decision to refuse life-sustaining treatment, the patient had to suffer because his physician prescribed numerous tests for him and did not prescribe the appropriate pain meds. I have become more vocal, ensuring my opinions and concerns are heard, even if it means addressing an attending physician directly." (P149)

(4) *Continuous Learning.* Participants strongly emphasized the importance of continuous learning to adapt to the challenges posed by the emergence of a new disease and to provide evidence-based care to their patients. They sought educational seminars and training opportunities, recognizing the importance of staying updated and informed in

their practice. Some participants elected to go further with their continuous learning by pursuing graduate education to deepen their clinical knowledge and professional development.

"I always study to find the latest evidence for my practice." (P305)

"Due to frequent reassignments to units where I was tasked with unfamiliar work, I felt the need for comprehensive knowledge, prompting my decision to attend a graduate nursing program." (P84)

(5) *Engaging in Self-Care.* The participants sought strategies to relax and maintain their emotional wellbeing. Prayer, meditation, and deep breathing were commonly identified for managing stress. Some nurses described seeking professional help from psychiatrists and psychologists to cope with the stress and emotional demands of their work. Nurses reported that support from family and friends also helped reduce moral distress.

"I used relaxation therapy, such as deep breathing and meditation." (P76)

"I talked to a psychiatrist to reduce my moral distress." (P158)

3.4.2. Negative-Coping Strategies

(1) *Adopting Avoidance Behaviors due to Feelings of Powerlessness.* Some nurses expressed feelings of powerlessness when confronted with morally distressing situations, leading them to use avoidance as a coping mechanism. They believed that, as nurses, they lacked the authority to effect meaningful changes and felt that their opinions would be disregarded by hospital managers. Consequently, the nurses would rationalize their inaction in morally distressing situations and attempt to distance themselves from such experiences by striving to forget or suppress them.

"In practice, there is nothing a nurse can do to solve the problems. Even when we voice our concerns, they tend to be overlooked, making us feel that our opinions hold no weight." (P197)

"I believed that, as a nurse, I lacked the authority to bring about real change, so I tried to avoid those distressing moments." (P106)

(2) *Becoming Passive in One's Role.* Some participants adopted a passive approach to work in response to stressful situations. They described feeling discouraged from taking proactive measures because they believed that the hospital did not value or accept their proactive attitude. Consequently, these participants limited themselves to completing only the assigned tasks without engaging in critical thinking

or going beyond their assigned responsibilities. In addition, they shared instances in which they ignored minor patient demands, considering them too burdensome or requiring excessive effort. Consequently, these participants adopted a formal, business-like approach when interacting with patients and focused solely on completing the basic and necessary tasks.

"I began to just stick to my assigned tasks without taking on any unnecessary duties." (P207)

"I only spoke when it was absolutely necessary." (P260)

"Given the overwhelming workload, I felt I could not change my situation, so I often overlooked patients' minor requests." (P241)

3.4.3. Shifting from Positive- to Negative-Coping Strategies.

Some participants reported a shift in their approach to managing their moral distress. Initially, they attempted to employ positive strategies such as referring patients to external support services and reporting inappropriate situations to their supervisors; however, their ability to effectively address moral distress was hindered after encountering challenges and obstacles within their institutions. The experience of encountering obstacles and a lack of organizational support profoundly impacted the nurses, leading to a sense of resignation, which resulted in their decision to leave their current job in some cases.

"Initially, I believed it was part of my role to seek external resources for patient recovery. But without any support, compensation, encouragement, or rewards, and even facing criticism for taking an initiative, I eventually stopped putting in the extra effort." (P16)

"I used to communicate my concerns to my manager or report them to the relevant department, but in the end, I decided to leave this job." (P96)

4. Discussion

To the best of our knowledge, this is the first study to examine the relationship among moral distress, burnout, and turnover intention among nurses and investigate the coping strategies that were employed to mitigate this distress within the Korean healthcare context using a mixed-methods approach. Our quantitative analyses revealed a significant association between higher levels of moral distress and increased turnover intention among nurses. Also, burnout was identified as a mediator in this relationship. Moreover, our qualitative analysis identified the various coping strategies nurses used to manage moral distress.

During the COVID-19 pandemic, nurses faced challenging situations leading to significant moral distress, as underscored by our findings and corroborated in a US study [38]. Both studies identified the increased patient care volume and potential infection risk to the nurses' families as the primary contributors to this distress. The global PPE shortage could have intensified this distress, leaving many

nurses unprotected, consequently heightening their anxiety [9, 10, 21, 38]. When planning for future pandemic response implementation, healthcare organizations must ensure adequate PPE supplies, enforce stringent safety measures [10, 38], and provide clearly communicated policies and guidelines [38] to minimize the risk of nurses experiencing avoidable moral distress.

Our findings build on previous research [13–16] and demonstrated a direct association between nurses' moral distress and turnover intention. Nursing professionals often derive motivation from the intrinsic value of their roles, commitment, and passion for patients [39]. However, when they encounter situations that conflict with their ethical practices, their professional satisfaction diminishes, leading to increased turnover intentions [40]. This issue became particularly apparent during the COVID-19 pandemic when nurses confronted moral distress due to barriers hindering high-quality care [10]. A prior study demonstrated that during the pandemic, nurses experienced higher levels of stress, leading to an increased intention to leave their positions, compared to prepandemic times [41]. In addition, consistent with previous findings [17, 18, 42], we also found that burnout significantly mediated the relationship between moral distress and turnover intention, which aligns with the moral distress model [43], positing that unresolved moral distress heightens burnout, further increasing their inclination to leave the nursing profession. Thus, effectively addressing moral distress can be a strategy for reducing burnout and nurse turnover [13].

Our qualitative analysis revealed a range of coping strategies that nurses adopted in situations causing them moral distress, ranging from positive to potentially negative approaches. In line with previous research [10, 21–23], we found that nurses engaged in self-care practices, such as prayer and meditation, to manage their distress. Positive-coping strategies in our study were marked by a proactive commitment to patient care. This commitment is evident in their strict adherence to infection prevention guidelines, reflecting their dedication to the safety and their patients' welfare. Moreover, nurses frequently exceeded their standard duties to ensure that patients experienced personalized care in the absence of family caregivers as they recognized the isolating circumstances of COVID-19 hospitalizations. They also actively voiced concerns about enhancing the quality of patient care. This deep commitment might be attributed to the unique emotional challenges posed by the COVID-19 pandemic, as suggested by Ahokas and Hemberg [44].

However, recognizing the negative-coping strategies driven by feelings of powerlessness and a lack of organizational and managerial support is equally important. Our findings revealed that nurses shifted from positive- to negative-coping strategies when they felt inadequate organizational support, underscoring the importance of organizational and managerial support. These insights emphasize the urgency for hospital administrators and nurse managers to genuinely value frontline nurses' feedback. Previous research has emphasized the significance of administrative support [45], suggesting that nurse managers should

establish clear policies and guidelines to promptly address nurses' concerns [38]. In addition, addressing the issue of moral distress during meetings can demonstrate to nursing staff that their wellbeing is a priority for their managers [44]. Moreover, nurse managers' inclusive leadership can be instrumental in supporting nurses experiencing moral distress because such leaders foster open communication, value diverse perspectives, and prioritize shared decision-making [46].

The findings also help conceptually delineate avoidable and unavoidable moral distress when implementing a pandemic response. Avoidable moral distress is associated with the structural and organizational factors related to implementing a pandemic response. These would include, but are not limited to, resource management, communication patterns, nurse staffing and managerial leadership and how organizational culture sets the tone for pandemic response implementation [47]. We theorize that avoidable moral distress is more likely to contribute to burnout because structural and organizational factors are perceived as being controllable and addressable than those associated with unknowns.

Unavoidable moral distress is that associated with the unknowns and uncertainties of working during a pandemic, such as the nature of the disease, its effects on patients and their caregivers, evolving treatments, and other factors [10]. Unavoidable moral distress is where resilience and coping strategies may play a stronger role in mitigating the stressors of working during a pandemic, along with perceived mental health and social support of nurses working on the frontlines of pandemics [10, 48, 49]. Conceptually distinguishing between the factors driving moral distress as experienced by nurses working the frontlines of pandemics is important for optimizing interventions and support services for them. It may further help develop our understanding of the drivers of turnover as well. Thus, there is a need for further research in this area.

This study had several limitations. First, we used a cross-sectional design; therefore, the causal relationships among the study variables cannot be determined. Second, the data were collected using self-reported questionnaires; thus, there might have been a potential desirability bias because some participants could have hesitated to provide honest answers to certain questions [50]. Third, the study only included nurses working in Korean acute care hospitals, which may not be generalized to other healthcare settings. Finally, although the open-ended questions allowed us to identify the coping strategies used by nurses, contextual information regarding the pre- and postapplication of these strategies was not collected. Therefore, future qualitative studies using alternative methods, such as in-depth interviews, could provide detailed and insightful responses from the participants.

5. Conclusions

During the COVID-19 pandemic, the immense challenges faced by healthcare professionals, particularly nurses, were undeniable. This study investigated the challenges faced by

nurses in Korea, highlighting the impact of moral distress on turnover intention, with burnout as a significant mediator. The unique aspects of pandemic care exacerbated moral distress, prompting nurses to adopt various coping strategies. Although some of these strategies were constructive, a shift from positive to negative mechanisms was evident in the absence of organizational and managerial support, highlighting the importance of robust institutional support. Our findings could provide valuable insights into leadership practices during future crises.

Data Availability

The data used to support the findings of this study are not available because the participants did not provide written consent for their data to be shared publicly.

Disclosure

The funding body had or has no involvement in study design; collection, management, analysis and interpretation of data; or the decision to submit for publication.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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Research Article

Motivation to Lead: A Study of the Supportive Nursing Leadership Environment

Sulaiman Al Sabei ¹, Amy Miner Ross ², Asma Al Yahyaei ¹, Leodoro Labrague ³,
Omar Al-Rwajfah ⁴ and Kylee Deterding ⁵

¹Fundamentals and Nursing Administration Department, College of Nursing, Sultan Qaboos University, P.O. Box 50, Al-Khodh 123, Muscat, Oman

²School of Nursing, Oregon Health and Science University, Portland, Oregon, USA

³School of Nursing and Healthcare Leadership, University of Washington, Tacoma, Washington, USA

⁴College of Nursing, Al Al-Bayt University, Mafraq, Jordan

⁵Oregon Health & Science University, School of Nursing, Portland, Oregon, USA

Correspondence should be addressed to Sulaiman Al Sabei; alsabei@squ.edu.om

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Background. With projected nursing shortages, an aging workforce, and the imminent retirement of nurse leaders, nursing leadership shortages are a concern. While several studies have indicated the interest of nurses in pursuing leadership positions, limited research has focused on examining the influence of the leadership practice environment on nurses' motivation to lead. **Aim.** The aims of the study were to (1) assess the relationship between the leadership environment and the motivation of nurses to lead and (2) determine whether there are particular aspects of the leadership environment that influence motivation to lead. **Methods.** A cross-sectional research design was used to collect data from 435 nurses working in 16 public and private hospitals in Oman. Leadership Environment Scale and Motivation to Lead Scale were used to assess participants' perceived leadership environment and their motivation to engage in formal leadership roles, respectively. Multivariate linear regression was used to assess the relationship between the perceived leadership environment and the motivation of nurses to undertake leadership roles. **Findings.** Nurses reported a mean scale value of 3.208 out of 5 (SD = 0.467) for their motivation to lead, which exceeds the midpoint, indicating a strong motivation to engage in formal leadership roles. Nurses reported a mean score of 3.194 out of 4 (SD = 0.661), which exceeds the midpoint, suggesting a favorable perception of leadership environment. The findings showed a significant relationship between the leadership environment and nurses' motivation to lead. Specifically, self-organization ($\beta = 0.185$, $p = 0.001$, CI = 0.086–0.378), agents ($\beta = 0.221$, $p = 0.002$, CI = 0.124–0.474), and transformative exchange ($\beta = 0.100$, $p = 0.037$, CI = 0.101–0.142) were characteristics of the leadership environment that were associated with greater motivation to engage in leadership. **Conclusion.** This study emphasizes the importance of cultivating a supportive leadership environment as a potential strategy to attract nurses to assume formal nursing leadership roles. **Implications for Nursing Management.** Strategies to improve nurses' motivation to lead in a complex healthcare environment include improving nurses' active involvement in their organization, creating a collegial supportive and mentoring leadership culture, and improving transformative exchange by supporting career and educational advancement.

1. Introduction

Nursing leadership is a critical factor that influences healthcare quality, patient outcomes, and organizational success. Effective nurse leaders guide teams, create positive work environments, and contribute to increased job satisfaction among nurses [1]. The role of nurse leaders is particularly crucial in addressing contemporary healthcare challenges and ensuring the resilience of nursing teams [2, 3]. Nurses' involvement in leadership positions within the healthcare system is a dynamic and evolving aspect which is crucial to delivering quality patient care and contributing to the overall effectiveness of healthcare organizations [4]. Traditionally, nurses have been at the forefront of direct patient care. However, there is a growing recognition of the need for nurses' active participation in leadership roles to address the complexities of modern healthcare [5, 6]. The involvement of nurses in leadership positions contributes to improving decision-making processes, enhancing coordination among healthcare teams, and fostering positive work environments [7]. Furthermore, as healthcare systems face challenges such as nursing shortages and increased demands, the active engagement of nurses in leadership positions becomes even more critical [8, 9].

Previous research on motivation to lead in the healthcare sector highlights the turnover intention of current nurse leaders [10, 11] and a persistent shortage of nurses' willingness to step into formal leadership roles [12, 13]. This scarcity is a critical concern given the acknowledged importance of motivating nurse leaders in achieving organizational goals and improving patient outcomes [1]. Upon closer examination, organizational variables emerged as significant contributors to nurses' hesitancy in embracing formal leadership roles. Issues such as inadequate leadership preparation, limited growth opportunities, and unsupportive work conditions emerged as crucial determinants impacting motivation to lead [14, 15]. This underscores the role played by the organizational context in shaping individuals' motivation to assume leadership responsibilities.

Recent research by Labrague et al. [9] shows a positive correlation between nurse confidence and desire to lead when working with authentic leaders. This emphasizes the influential role of the leadership environment on motivation to lead. In Oman, nearly 70% of millennial nurses expressed an intention for career advancement in assuming nursing leadership responsibilities [16]. Currently, in Oman, there are 21,288 registered nurses and a significant proportion are expatriates [17]. Fostering a culture that encourages nurses to assume leadership roles becomes essential to build a resilient and adaptable nursing workforce [17]. Understanding the factors that motivate nurses to assume leadership responsibilities is a critical step in tailoring interventions and support systems that align with the unique challenges and dynamics of the Oman health system.

Although several studies investigated the factors that contribute to nurses' motivation to lead [9, 13, 14, 18], limited evidence exists on the influence of the leadership environment. Therefore, the aim of this study was to

examine the influence of leadership environment on nurses' motivation to lead. The study hypothesis is that there is a significant relationship between leadership environment and nurses' motivation to engage in leadership roles. In addition, the study intended to determine whether there are particular aspects of the leadership environment that influence motivation to lead. A unique contribution of this study is the use of complexity leadership theory, which contributes to the limited empirical research in this area. It also facilitates a better understanding of the complex relationship between nurses' motivations to assume leadership roles and specific dimensions of the leadership environment.

2. Theoretical Framework

The current study was guided by the complexity leadership theory. Complexity science posits that a system is more aptly described as a complex adaptive system (CAS), where the structure is nonhierarchical and nonlinear [19, 20]. People, objects, or processes (known as agents) have widespread impact on the system and from the system outward. Leadership culture is the feature that makes the difference and determines the impact of agents [5, 21].

In a CAS, the leaders (sometimes nurse managers, directors, or chief nursing officers) create the space to work (known as containers) so that several outcomes can be achieved simultaneously. The process in a CAS is therefore nonlinear. The advantage of a nonlinear system is the allowance for self-organization that supports shared governance and decision making. In any level in a CAS, accountability particularly resides in shared power and decision making [21]. People, in a CAS, bring different perspectives and resources to relationship exchanges where each exchange has the potential to transform the other agent [22]. These exchanges support the emergence of new or unexpected ideas, structures, or patterns of work. People, when in relationship and involved in transformative exchanges, are also changed in the process of coevolution [21]. Most healthcare systems, within which nurses work, have the attributes of a CAS.

A person motivated to lead does so within a system or context. The leadership context or leadership environment is important to identify, as some of the aspects of that environment can be modified to foster nurses' feelings of support and, therefore, a desire to lead. According to the CAS, those aspects are self-organization, agents, shared governance and decision making, emergence, transformative exchanges, different perspectives, and coevolution [23].

The seven CAS aspects of the work environment, mentioned above, have relatedness to the constructs of motivation (assuming more or higher-order responsibilities and advancement in organization positions) and leadership (involvement in and influence in decision making). The framework shows a unidirectional impact (Figure 1). Motivation to lead occurs within the context or leadership environment. This is the same as nurse leaders setting the space/container for self-organization, engaging agents (in the process of motivation), and allowing transformative exchanges between agents with different perspectives. What follows is the emergence of coevolution that can also become

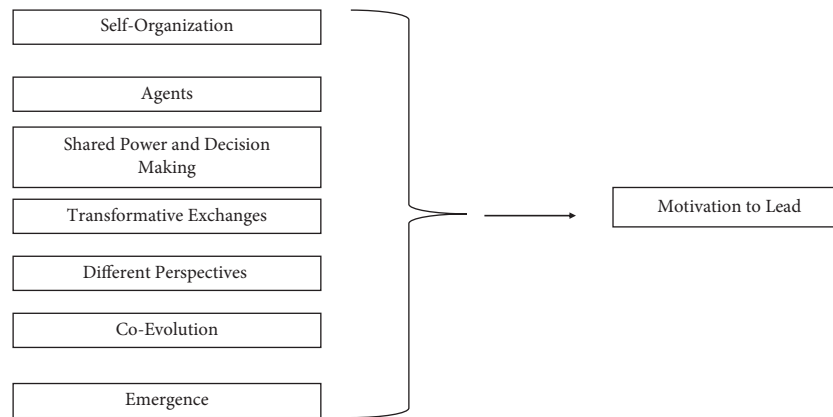


FIGURE 1: Theoretical framework.

shared power and decision making, hallmarks of leading. Since the research aim was to delineate the pertinent aspects of the leadership environment that are related to willingness to lead, the complexity leadership theory was chosen over other leadership theories or styles. The LENS as a measure will provide details of the environment that can be enhanced or mitigated in order for more nurses to be willing to lead. Other measures of leadership do not completely apply to the context or environment within which nurses lead.

3. Materials and Methods

3.1. Study Design and Setting. A cross-sectional design was used. Self-reported data were collected from staff nurses working in 15 acute care public and private hospitals in the Sultanate of Oman. The hospitals were distributed over different geographical areas of Oman, making the sample highly representative of the nursing workforce working in the acute care setting in Oman.

3.2. Study Sample. A convenience sampling technique was adopted to gather data from registered nurses working in public and private hospitals in the Sultanate of Oman. The use of convenience sampling might have created sampling bias. To reduce it, the study utilized a national sample by including hospitals from different governorates of Oman.

The inclusion criteria were registered staff nurses providing bedside care, holding a minimum diploma in nursing, being licensed, and having at least one year of experience in their current unit, and able to read and write English language. Unit managers were excluded from the study as they are in a leadership position, which negates the main purpose of the study. The estimated sample size of the study was 540 participants based on the G-Power priori sample size calculator [24]. A statistical power of 80%, 10 predictors, a small effect size, and a probability level of 0.05 were used to calculate this sample. The survey was distributed to 540 nurses, where a total of 435 nurses participated, resulting in an 80.6% response rate.

3.3. Study Instruments. Data were collected using a paper-based survey. All study instruments were administered in English. The study instruments consisted of three sections:

sociodemographic information, the Leadership Environment Scale, and the Motivation to Lead Scale. The sociodemographic section includes questions about the age, sex, years of work experience, education level, nationality, and previous leadership experience and training.

The perceived leadership environment was measured using the 16-item Leadership Environment Scale (LENS) [23]. The scale assesses nurses' perceptions of nurses about seven domains of the leadership environment including (1) self-organization, which is defined as the creation of self-organizing systems (by individuals or groups) through feedback, self-reference, and effective information use; (2) agent, which is defined as a person, object, or process that has an impact on a system at a local and global level, and these agents provide insights into the structure of a complex adaptive system; (3) shared power and decision making, which are the key components of a self-organizing system that ideally occur at the point where actions are to be executed and accountability is expected; (4) emergence, which is defined as an unexpected idea, structure, or pattern that arises without any prior warning or preparation; (5) transformative exchanges, which refer to a series of interdependent connections within a complex adaptive system where information and resources are shared in such a way that each agent involved is altered as a result of the exchange; (6) different perspectives, which are defined as differences that affect both the work and relationships within a system; and (7) coevolution, which is defined as the mutual change that occurs between them when they are in relationship [23]. As one agent adapts and mirrors, another agent also changes. These domains were adopted from the key features of complexity leadership theory [21]. Responses were rated using a 4-point Likert scale in which 1 refers to strongly disagree and 4 refers to strongly agree. Higher scores indicate a more favorable perception of the leadership environment. The scale is valid and reliable with Cronbach's alpha of 0.91 [23]. In the current study sample, Cronbach's alpha was 0.81.

Nurses' motivation to engage in formal leadership roles was measured using the 3-item Motivation to Lead Scale (MTL) [25]. Responses were rated using a 5-point Likert scale in which 1 refers to strongly disagree and 5 refers to strongly agree. Higher scores indicate a greater motivation to

engage in formal leadership roles. The scale is valid and reliable with Cronbach's alpha of 0.78 [16]. In the current study sample, Cronbach's alpha was 0.88.

All of the data were collected using a self-reported method. To reduce the possibility of the response bias, all data were collected anonymously with no identification.

3.4. Ethical Considerations and Data Collection Procedure.

Prior to data collection, ethical approval was obtained from the Oman Ministry of Health Research and Studies Approval Committee (MoH/CSR/22/26226). The recruited hospitals also provided administrative permission to collect the data. Written informed consent was obtained from the study participants.

Participants received a package containing an information sheet, an informed consent form, a survey, and an envelope. This information sheet provided information about the study's aims, procedure, the time required to complete the survey, assurances of voluntary participation and confidentiality, and contact information for the principal investigator for additional clarifications or information if needed. To facilitate the deposit of completed surveys, drop boxes were located in nursing stations. Data were collected over five months, between August 2022 and February 2023.

3.5. Data Analysis. The Statistical Package for the Social Sciences (SPSS)[®] version 23 was used to analyze the data. Descriptive statistics of frequencies, standard deviations, and means were used to describe the study sample. Multivariate linear regression was used to examine the relationship between the leadership environment and nurses' motivation to lead, controlling for the sociodemographic and work characteristics of the participants. The significance level was established at $p < 0.05$. No missing data were reported and no sensitivity analyses were conducted.

4. Results

A total of 435 nurses participated in the study. The sample was predominantly female (87.4%), with an average age of 43.85 years ($SD = 6.549$) and 11.40 years of work experience ($SD = 6.652$). Of the 435 participants, more than half were expatriate (51.3%), and 56.1% held a diploma in nursing. The majority of the sample had no previous leadership experience or received leadership training (66.7% and 70.8%), respectively (Table 1).

4.1. Perception of Leadership Environment and Motivation to Lead. The mean scale value for LENS was 3.194 out of 4 ($SD = 0.661$). Across the seven leadership environment domains, nurses perceived emergence followed by the transformative exchange as the highest. Nurses perceived self-organization as the lowest available feature of their leadership environment in which nurses reported lack of time to participate actively in changing their work setting (Table 2).

TABLE 1: Sample characteristics ($N = 435$).

Variables	Mean	SD
Age	34.853	6.549
Years of experience	11.396	6.652
	<i>n</i>	%
Gender		
Male	55	12.6
Female	380	87.4
Nationality		
Indigenes (local)	212	48.7
Expatriate	223	51.3
Highest education level		
Diploma	244	56.1
Baccalaureate	178	40.9
Master	13	3.0
Type of working unit		
Medical/surgical	134	30.8
Critical care	97	22.3
Neonatal and pediatric	42	9.7
Maternity	103	23.7
Operating room	34	7.8
Others*	25	5.7
Hospital teaching status		
Teaching	216	49.7
Nonteaching	219	50.3
Hospital type		
Public	362	83.2
Private	73	16.8
Previous leadership experience		
No	290	66.7
Yes	145	33.3
Previous leadership training		
No	308	70.8
Yes, and it was adequate	96	22.1
Yes, but it was not adequate	31	7.1

*Included nurses working in multispecialty units, outpatient clinics, and cath lab.

The mean scale value for MTL was 3.208 out of 5 ($SD = 0.467$). The findings also revealed that most of the study participants (85.1%) reported a desire to advance their career and assume greater responsibility. Additionally, 83.5% indicated an intention to assume different responsibilities in their current roles and 83.5% intend to advance to positions that involve more decision making (Table 3).

4.2. Relationship between Leadership Environment and Motivation to Lead. A multivariate regression model was conducted to assess the relationship between nurses' perception of the current leadership environment and the reported motivation to engage in leadership roles controlling for age, years of experience, nationality, level of education, type of working unit and hospitals, previous leadership training, and experiences (Table 4). After testing for multicollinearity, no evidence of multicollinearity was observed.

The findings demonstrated a significant relationship between leadership environment and nurses' motivation to engage in leadership roles controlling for other covariates, supporting the study hypothesis. In addition, the study

TABLE 2: Descriptive summary and responses on Leadership Environment Scale.

Item	Mean	SD
Leadership Environment Scale*	3.194	0.661
Self-organization	3.135	0.503
I have time to actively participate in efforts to change practice in my work setting	3.064	0.599
Nursing determines its own policies and procedures	3.206	0.545
Agents	3.173	0.473
Nurse colleagues are demonstrating leadership in nursing practice	3.206	0.537
In my work setting mentorship is available to me for my day-to-day work and/or career	3.172	0.564
People I work with appreciate my perspectives, even though these may be different from their own	3.142	0.613
Shared power and decision making	3.217	0.516
Nurses in my workplace have good working relationship with other professionals	3.255	0.561
The administration listens and responds to employee concerns	3.183	0.598
Emergence	3.309	1.155
By working as a group, we achieve more than any one of us alone	3.264	0.548
I engage in leadership in my work setting	3.211	0.630
Transformative exchange	3.231	0.847
The person I report to works to have a good relationship with me	3.225	0.625
My organization supports me in advancing my education	3.200	0.660
My organization supports me in advancing my career within our system	3.179	0.610
Different perspectives	3.202	0.509
Other disciplines value the work of nursing	3.225	0.551
Innovative ideas about patient care are supported	3.179	0.563
Coevolution	3.192	0.527
When working with other people our relationships mutually benefit each other	3.227	0.572
I take time to reflect on my work and career	3.156	0.582

*Scale composite score.

intended to determine whether there are particular aspects of the leadership environment that influence motivation to lead. Findings demonstrated that self-organization ($\beta = 0.185$, $p = 0.001$, $CI = 0.086-0.378$), agents ($\beta = 0.221$, $p = 0.002$, $CI = 0.124-0.474$), and transformative exchange ($\beta = 0.100$, $p = 0.037$, $CI = 0.101-0.142$) were specific elements of the leadership environment associated with higher motivation to engage in leadership. The overall R^2 of the model was 0.38, which reflects that the model was successful in explaining 38% of the variance in nurses' motivation to lead the score.

5. Discussion

This study examined the relationship between leadership environment and nurses' motivation to lead. The mean score obtained on the LENS suggests that nurses perceive their leadership environment positively. In other words, they likely view their leadership as supportive, effective, and conducive to their professional growth and well-being. This result is encouraging given that a favorable leadership environment is critical for the overall success and well-being of an organization [26]. When leaders create an atmosphere of trust, respect, and support, employees are more likely to feel satisfied and engaged in their job [27]. Moreover, a favorable leadership environment fosters a culture of collaboration and open communication, where ideas are freely exchanged, and innovation is encouraged [28, 29]. This, in turn, leads to higher levels of productivity and better organizational outcomes [30].

The mean score on the MTL, which exceeds the mid-point, suggests a strong desire or motivation among people to pursue formal nursing leadership roles in the future. Across the MTL items, 85.1% of the participants expressed a desire to advance in the nursing career and assume more responsibilities. This aligns with Labrague et al.'s [16] findings where 70% of nurses shared a similar aspiration for career advancement. This result implies that there is a notable readiness and eagerness among nurses to embrace formal nursing leadership roles, potentially contributing to the cultivation of future nursing leaders and the advancement of nursing practice and healthcare delivery. The overarching endorsement of career advancement among nurses in the present study emphasized the necessity of structural empowerment for upward mobility in leadership and highlighted the crucial role of the work environment in fostering nurses' willingness to assume leadership roles.

The results of the multiple regression analysis showed a positive relationship between leadership environment at work and nurses' motivation to lead. To our knowledge, this study was the first to explore the specific features within the leadership environment that strongly influence nurses' motivation to undertake leadership roles. Hence, this study provided the necessary information to optimize organizational efforts and drive meaningful improvements in leadership development. Nevertheless, the results from the current study suggested that when nurses perceive their work environment as supportive, conducive to growth and development, and characterized by effective leadership, they are more likely to be motivated to pursue leadership roles in

TABLE 3: Response on the Motivation to Lead Scale.

MTL items	Strongly disagree <i>n</i> (%)	Disagree <i>n</i> (%)	Neither <i>n</i> (%)	Agree <i>n</i> (%)	Strongly agree <i>n</i> (%)
(1) I desire career advancement to assume more responsibility	5 (1.1%)	11 (2.5%)	49 (11.3%)	277 (63.7%)	93 (21.4%)
(2) I would like to take on different responsibilities compared to those my job position requires	1 (0.2%)	22 (5.1%)	49 (11.3%)	274 (63%)	89 (20.5%)
(3) I would like to advance in organizational positions that require greater involvement and influence in organizational decision-making processes	1 (0.2%)	19 (4.4%)	52 (12%)	263 (60.5%)	100 (23%)

TABLE 4: Multiple regression on the relationship between leadership environment and nurses' motivation to engage in leadership roles.

Variables	B	SE	MTL		
			β	t	p value
(Constant)	1.422	0.331		4.290	<0.001
Leadership environment					
Self-organization	0.238	0.072	0.185	3.322	0.001
Agents	0.283	0.087	0.221	3.031	0.002
Transformative exchange	0.075	0.036	0.100	2.051	0.037
Different perspectives	0.080	0.078	0.065	1.029	0.304
Coevolution	0.148	0.076	0.122	1.945	0.066
Shared power and decision making	0.073	0.077	0.057	0.945	0.345
Emergence	0.006	0.024	0.011	0.257	0.798
Sociodemographic characteristics					
Age	0.006	0.024	0.011	0.254	0.800
Men versus women	0.035	0.058	0.027	0.596	0.551
Years of experience	0.001	0.008	0.009	0.110	0.913
Expatriate versus indigene nurses	-0.011	0.008	-0.111	-1.295	0.196
Having leadership experience versus not having	0.019	0.079	0.010	0.241	0.810
Having leadership training versus not	0.022	0.066	0.016	0.338	0.735
Education (reference: diploma)					
BSN degree	0.055	0.048	0.053	1.143	0.254
MSN degree	-0.036	0.062	-0.027	-0.578	0.564
Private versus public hospital	0.043	0.092	0.026	0.468	0.640
Teaching versus nonteaching hospital	0.055	0.054	0.043	1.009	0.314

MTL: Motivation to Lead Scale. $p < 0.05$.

the nursing profession. In other words, a more favorable and empowering work environment, where leadership is perceived positively, can serve as a catalyst for fostering nurses' aspirations and intentions to take on leadership responsibilities. Previous studies have shown that with a desirable work environment, nurses are provided with management and leadership advancement, engagement, coaching, mentoring, leadership modeling, and adequate structural resources, which all contributed to increase their willingness to engage in leadership tasks [9, 11, 31]. Positive work environments can increase the intention of nurses to lead, as well as enhance their professional development. This finding was reported in previous research that suggested that a favorable work environment is positively associated with the leadership career advancement [9, 13, 32]. Overall, this finding underscores the importance of cultivating a nurturing and supportive organizational culture. This can inspire nurses to develop their leadership potential, which ultimately contributes to the advancement of nursing practice and the delivery of quality patient care.

A significant contribution of the present study lies in its ability to link the results to Ross et al.'s conceptual framework, framing the results through the seven dimensions of the LENS. The framework was proposed to describe the leadership environment experienced by nurses in their practice settings. While the LENS respondents were direct care nurses from Oregon in the USA, the current study respondents were direct care nurses from Oman. Oregon nurses were on average 10 years older and there was a 10% higher number of nurses with baccalaureate degrees [23]. However, the percentage of nurse respondents in both countries who reported they were female was the same. These similarities made drawing conclusions about the work

environment and its effect on the leadership environment very sensible. In fact, the findings of the current study support the notion that, regardless of the cultural difference between different countries, the workplace environment is still a critical factor that influences the leadership environment among direct care nurses. It is important to acknowledge that the leadership environment between the two countries is different. For example, the findings of the current study suggested that nurses identified emergence, closely followed by transformative exchanges, as the highest features of the leadership environment. This differs from the results from LENS study in Oregon, where the highest endorsement was for coevolution, emphasizing mutual benefit in working with others.

The specific domains of the leadership environment that significantly influenced nurses' motivation to lead were self-organization, agents, and transformative exchanges. These domains are malleable and can be influenced by relationships and system supports, as indicated by the two-factor solution proposed by Ross et al. [23]. Self-organization is oriented towards the individual and how they can foster relationships within their organization. Nurses in the current study rated self-organization as the least obvious feature of the leadership environment. A similar finding was reported by Ross et al. [23]. According to the complexity theory, self-organizing systems emerge through the ability to be self-directed and effective utilization of available resources and information [5, 23]. This indicates the need to provide nurses with adequate knowledge, skills, resources, and authority to be actively involved in decision making and organizational change.

Agents are codependent on their relationship with each other, people, processes, and perspectives, specifically

mentorship, understanding of different perspectives, and modeling leadership, and they can influence systems at a distance, such as seen in the butterfly effect (a hallmark of the CAS). Transformative exchanges are the currency that the health system uses to influence locally and at a distance. Transformative exchanges are used in self-organization between agents within the system. These exchanges show nurses the support they have from their supervisor and the system, as well as how the system supports their educational advancement into potential leadership roles [21]. In order to improve the transformative exchange within healthcare settings, it is important to foster a culture of continuous learning and mentorship, by current nurse leaders. Encouraging ongoing professional development and providing mentoring opportunities can contribute significantly to the growth of potential leaders.

Motivation to lead is a multifaceted construct influenced by a variety of factors [14, 15]. Given that only 38% of the variance in motivation to lead was explained by the leadership environment, there may be other significant elements contributing to this outcome. High workloads and inadequate staffing are crucial factors that can lead to burnout, work dissatisfaction, and reduced motivation to take on additional leadership responsibilities [13, 16, 33, 34]. Educational background and professional development opportunities also play a significant role; nurses with higher education levels and access to continuous learning may be more inclined to pursue leadership roles [16]. Personal characteristics, such as leadership self-efficacy, career aspirations, and individual interest in leadership, further impact motivation [7, 16, 35]. Moreover, the presence of structural elements such as professional advancement opportunities, robust leadership and managerial support, and sufficient hospital resources may profoundly influence nurses' confidence in their leadership abilities and, consequently, their inclination to assume leadership roles [7, 15, 16]. These confounding factors suggest that a multifaceted approach is necessary to fully understand and enhance nurses' motivation to lead. Hence, future research should be conducted to take these elements into account and provide a more comprehensive understanding of what drives nurses to assume leadership roles.

5.1. Implications for Nursing Management. The most important implications of this study are that leaders should be aware of the importance of the leadership environment to front-line leaders, as well as their capacity to influence and create such environment. According to this study, emergence and transformational exchanges dominate the leadership environment, indicating that establishing a positive team culture is key to creating a desirable work environment. In addition, by investing in succession planning and mentorship programs, nurse leaders can ensure a smooth transition of leadership roles and sustain the continuity of effective leadership within the nursing workforce [29]. The findings of this study point to the importance of changing the leadership environment. Even though previous studies by Cziraki et al. [7] and Mascia et al. [25] found that self-efficacy was a significant factor in MTL, the environment

within which leaders develop and lead may trump self-efficacy or any demographic factors. In the leadership environment, agents, self-organization, and transformative exchanges are the strongest domains that can influence motivation to lead.

The other implications that can be linked to the findings of the current study are that nurse managers are to take the lead in changing the environment within their sphere of influence and setting the container or creating the space, so nurses not only cope with stress and change but also can fulfil their potential as leaders. To achieve this, nurse leaders are strongly recommended to implement the following strategies. First, as an agent, the nurse leaders are required to create the space and set the container within which all the work of developing new nurse leaders will occur. Second, nurse leaders identify candidates for leadership development who are known to have diverse perspectives. Third, create, in conjunction with the leadership candidate, pertinent resources to support the development of leadership skills. Fourth, provide opportunities for self-organization and transformative exchanges while staying in relationship.

Lastly, it is important to periodically assess the leadership environment, especially before any planned changes within the work environment. This baseline assessment can provide better insight into the change in the work environment and its relationship to the leadership environment at the unit and institutional levels.

5.2. Study Limitations and Future Research. Because the study used a cross-sectional design, the causal relationship between leadership environment and nurses' motivation to lead was limited. Additionally, the sample included nurses working in acute care hospitals; therefore, the generalizability of the study findings to other types of hospitals could be limited. Future study utilizing a longitudinal design including nurses from diverse hospitals such as general primary, tertiary, and acute care hospitals, assessing nurses' perception of their leadership environment and motivation to lead are recommended. Suggestions for future research also include conducting a longitudinal interventional study measuring the LENS prior to educational enhancement on leadership development and mentorship and three to six months after the intervention.

6. Conclusions

The study findings highlight the critical need to foster a nurturing and supportive organizational culture that motivates nurses to explore and expand their leadership capabilities. By doing so, organizations can significantly advance nursing practice and enhance the quality of patient care they provide. Recognizing aspects of self-organization, agent dynamics, and transformative interactions within the healthcare system presents a strategic approach to nurturing nurses' motivation to assume leadership roles, fostering a positive work culture, and improving the overall leadership environment in healthcare settings. While this study was conducted specifically within the context of Oman, the

implications of fostering a supportive nurse practice environment are broadly relevant to healthcare systems globally. Healthcare organizations worldwide can benefit from these insights by investing in leadership development and creating a culture that supports nurses, ultimately leading to improved patient outcomes and enhanced nursing practice.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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Research Article

The Nexus Between Medical Care Policy Alienation and Career Success: A Cross-Sectional Study

Jia Xu ¹, Chun Xia ², Hui Zhu ¹ and Xiuzhen Ding ³

¹School of Marxism, Anhui Normal University, Jiuhua-Nan-Road 189, Wuhu 241000, China

²School of Educational Science, Anhui Normal University, Jiuhua-Nan-Road 189, Wuhu 241000, China

³School of History, Anhui Normal University, Jiuhua-Nan-Road 189, Wuhu 241000, China

Correspondence should be addressed to Chun Xia; xiachun@mail.ahnu.edu.cn

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Aim: This study examines the interrelationship between medical staff's sense of medical care policy alienation (SPA) and their subjective career success and the potential mediating roles of occupational calling (OC) and job satisfaction.

Background: Medical staff's pivotal role in medical care policy implementation outcomes underscores their approach to career success, which affects work efficiency, and willingness to implement medical care policy. Effective policy is anticipated to be positively and rationally implemented, fostering favorable perceptions and career success among policy executors such as medical staff. However, limited research examines the relationship between career outcomes and medical staff's SPA.

Methods: A cross-sectional study conducted from May to June 2023 collected data from 521 medical staff in 14 hospitals in northern, western, and southern China through questionnaire surveys. The questionnaire measured their SPA, OC, job satisfaction, and career success. A chain multiple mediation model was constructed to explore SPA's relationship with medical staff's OC and job satisfaction, resulting in less career success, and whether work overload moderated this relationship.

Results: Medical staff's SPA was negatively related to career success via a chain mediation mechanism involving OC and job satisfaction. Work overload did not moderate SPA's negative association with OC; however, it moderated its association with job satisfaction. High workload intensified SPA's association with job satisfaction, increasing the mediating effect on career success compared to those with lower workloads.

Conclusion: Medical staff's SPA was significantly negatively related to career success, reflected in a weakened OC, and decreased job satisfaction. Work overload somewhat moderated the relationship between SPA and job satisfaction. Policymakers and medical stakeholders should emphasize improved communication between medical institutions and staff, which is essential for crafting and disseminating medical care policies. Medical care policy implementation should be enhanced in diverse Chinese contexts to enrich the understanding of medical policy management.

Keywords: career success; job satisfaction; medical care policy alienation; medical staff; occupational calling; work overload

1. Introduction

Career success substantially influences medical staff's occupational outcomes, work efficiency, and willingness to implement medical care policies. It also supports them in managing challenges during the process of medical care policy implementation [1–3]. While effective social policy, such as medical care policy, is expected to be well-designed

in terms of its original intent and rationality, it should also foster positive perceptions and attitudes among policy executors, such as medical staff, toward its implementation [4].

From the perspective of the social psychological motivation behind frontline policy executors' implementation of social policy, Tummers et al. [5] introduced the concept of "policy alienation" among policy executors (such as medical staff). This concept refers to a general cognitive state of

psychological disconnection from the policy program implemented by a public professional who regularly interacts directly with clients [5]. Scientists then utilized this concept to assess the extent to which policy implementation outcomes might be affected by policy executors' subjective sense of policy alienation while seeking possibilities to improve policy implementation performance [3]. Studies have found that the policy alienation of policy executors not only affects their willingness to implement social policies [6] but also affects their job performance, work efficiency [3, 7], and general well-being [8].

However, existing research has not sufficiently explored the mechanism by which policy alienation impacts the career success of policy executors, such as medical staff [8], nor has it analyzed the conditions under which policy alienation has an impact on them [9]. The literature has also overlooked the potential impact that medical care policies may have on the career success and work management of medical staff.

Therefore, it is crucial to introduce effective and innovative medical care policies globally and to continue with medical care policy reforms. Equally important is ensuring the successful implementation of these policies by local policy executors, such as medical staff, as this contributes to their career success and work efficiency [10, 11]. To address this research gap and contribute to the existing literature, this study proposes a theoretical moderated chain mediation model that includes the variables of occupational calling (OC), job satisfaction, sense of medical care policy alienation (SPA), career success, and work overload. It is important to note that this research model remains theoretical, and the available data do not permit the testing of the processes involved.

This study defines OC as the pursuit of a meaningful and prosocial career driven by an external force, characterized by a transcendent passion to use one's talent to fulfill a particular life role, thereby deriving a sense of purpose as a primary source of motivation [12, 13]. Job satisfaction refers to the assessment of the favorability of a job, typically reflecting an individual's overall evaluative judgment about their job [14, 15]. SPA refers to a multidimensional construct that encompasses residents' perceptions of a disconnect from medical care policy. Career success is defined as an individual's subjective evaluation of their career accomplishments [1, 16]. Work overload refers to the excessive demands placed on an individual due to the performance requirements of their job [17, 18].

The control variables include respondents' demographic information, such as gender, age, educational level, and marital status. This study also controls for the level of the medical institution at which medical staff work, their professional titles, and whether they have management responsibilities. It also controls for medical staff's health status, using the presence of chronic diseases as a proxy indicator of health condition.

This study contributes to the literature by addressing a critical gap in career development research; it expands the scope of "career success" studies within the context of medical staff, broadening the research concerning medical staff work management. It also offers a deeper

understanding of the mechanisms by which SPA may undermine medical staff's experience of career success. It highlights that the SPA of medical staff may be higher in cases where they face work overload, thereby providing insights into work patterns that could improve their work efficiency.

1.1. Research Hypotheses. This study proposes six hypotheses based on moderating and mediating analyses, grounded in relevant literature. First, as society advances in the information age, the trend toward organizational flattening becomes more obvious, blurring traditional occupational hierarchies [19–21]. Coupled with the development of the platform economy, promotions and salary increases, traditionally used as core indicators to measure objective career success, are increasingly being questioned in academia [22–24]. Some scholars argue that objective career success cannot be used as the only indicator of a person's career performance [4]. By contrast, subjective career success has gradually been recognized in academic discourse as an important indicator of individual career performance [25, 26]. Subjective career success "capture(s) individuals' subjective judgments about their career attainments" [1] and is often defined as the accumulated positive work and psychological outcomes resulting from one's work experiences [27]. Nevertheless, a sense of policy alienation can negatively impact the career success of medical staff. This is because, on the one hand, medical staff with high SPA are more inclined to doubt the value of medical policies for patients and society [27]. Since their work goals are to support patients in recovery, it is difficult for them to integrate medical policy resources into their work when experiencing high levels of SPA, hindering their career success. Subsequently, medical staff with high SPA often feel disconnected from medical care policy formulation, implementation, or reform, which can lead them to perceive that medical policy cannot support them with work-related challenges. Thus, they experience decreased work efficacy and weaker work management, resulting in difficulties in achieving career success [28]. Furthermore, medical staff with high SPA are more likely to doubt the feasibility of implementing a given medical care; however, as frontline policy executors, medical staff should trust in the implementation of medical care policies. This dilemma can cause psychological conflicts for medical staff, requiring them to spend more psychological resources dealing with these conflicts, thereby depleting the psychological resources necessary for work, and resulting in lower career success possibilities [29]. Based on this analysis, we propose the following hypothesis:

Hypothesis 1. SPA is significantly negatively related to the career success of medical staff.

Second, based on existing literature, we argue that SPA can weaken an individual's OC. First, medical staff with high SPA are inclined to doubt the practical value of medical policies for residents and society as a whole [7, 30], which may hinder their OC [31]. In addition, medical staff with

high SPA tend to perceive that they have minimal influence over medical policy formulation and implementation [5, 32]; consequently, their sense of purpose to fulfill their prosocial role at work could be weakened, resulting in a low level of OC. In addition, medical staff with high SPA may believe that medical care policy cannot be implemented efficiently for those with medical care needs, which may also lead to doubts about promoting the greater good [31, 32].

OC has a significant positive impact on career success. Individuals with strong OC are highly motivated at work, which often results in better work performance, a higher likelihood of career success, and high work efficiency [33, 34]. They are less likely to give up when encountering workplace challenges, increasing the probability of career success [35, 36]. Additionally, they may regard work as a means of achieving both external and internal work-related goals, such as earning a living and personal satisfaction and fulfillment of work values, respectively [37, 38]. Therefore, individuals with high OC may be better at balancing the external and internal goals that lead to career success. Based on this analysis, we propose the second hypothesis:

Hypothesis 2. OC mediates the association between SPA and career success of medical staff.

Third, we argue that SPA is significantly negatively related to the job satisfaction of medical staff because they tend to think of medical care policy as having little value [39]. This devaluation of policy implementation can diminish their sense of purpose and fulfillment as policy executors, leading to lower job satisfaction. This study also assumed that high SPA might lead to feelings of self-worthlessness in medical policy implementation, resulting in a weak perception of mastery and autonomy in their work [8, 40]; consequently, medical staff may experience less career success. Organizational behavior research has also suggested a correlation between job satisfaction and career success [1, 3]. Based on the above analysis, this study proposes its third hypothesis.

Hypothesis 3. Job satisfaction mediates the association between SPA and the career success of medical staff.

Fourth, this study argues that both OC and job satisfaction, which are interrelated, mediate the relationship between SPA and career success and that the medical staff's OC is positively associated with job satisfaction level. We assume that medical staff with strong OC gain high job satisfaction because of their consistent engagement in work values and long-term development goals [37, 41]. Moreover, medical staff with high OC can more easily identify their work as not only a means to make a living but also to contribute to the greater good, fostering a sense of accomplishment and leading to increased job satisfaction [33, 42]. In addition, this study proposes that medical staff with strong OC are inclined to believe that their work is aligned with societal needs, which connects them to broader humanistic goals, evokes positive emotions, and increases their job satisfaction and work efficiency [31, 43]. Based on the above analysis and considering the association between SPA and OC and that between job satisfaction and career success, we propose the fourth hypothesis.

Hypothesis 4. OC and job satisfaction mediate the relationship between SPA and career success among medical staff.

Fifth, many studies have found that SPA has negatively relationship with work performance, with outcomes such as reduced trust in government, decreased willingness to implement policies, and increased job burnout [8, 44]. However, the literature has not explored the conditions under which SPA might exacerbate work and career consequences for employees nor the extent to which possible interventions could mitigate these effects. Therefore, this study proposes that workload moderates the association between SPA and the outcome variables.

For example, compared to a normal workload, overloaded medical staff experience more negative emotions [45]. SPA might amplify these negative emotions, further undermining their work status and experience and weakening their job satisfaction and OC. Furthermore, when medical staff are overloaded, they may have less time to communicate with patients [46], exhibit impatience with patients [47], or foster a mutually distrustful climate between doctors and patients. These outcomes can lead to more serious consequences if medical staff are also experiencing strong SPA. Based on the above analysis, we propose the fifth and sixth hypotheses of this study.

Hypothesis 5. Workload moderates the relationship between SPA on OC for medical staff; in cases where medical staff experience work overload, SPA has a stronger negative relationship with OC.

Hypothesis 6. Workload moderates the relationship between SPA and job satisfaction for medical staff; in cases where medical staff experience work overload, SPA has a stronger negative relationship with job satisfaction.

The theoretical mediational model of this study is presented in Figure 1.

Hypotheses: (i) SPA has a significant negative impact on the career success of medical staff; (ii) OC mediates the association between SPA and career success among medical staff; (iii) job satisfaction mediates the association between SPA and the career success of medical staff; (iv) OC and job satisfaction mediate the relationship between SPA and career success among medical staff; (v) workload moderates the impact of SPA on OC for medical staff: in cases where medical staff experience work overload, SPA has a stronger negative impact on OC; and (vi) workload moderates the impact of SPA on job satisfaction for medical staff; in cases where medical staff experience work overload, SPA has a stronger negative impact on job satisfaction.

2. Materials and Methods

2.1. Research Design. We conducted a cross-sectional study to collect sample data from May to June 2023. The sample consisted of medical staff from 14 hospitals in four cities in northern (Changchun City), western (Chengdu City), and southern China (Shangrao City and Hefei City). These 14 hospitals are classified as secondary and tertiary hospitals in

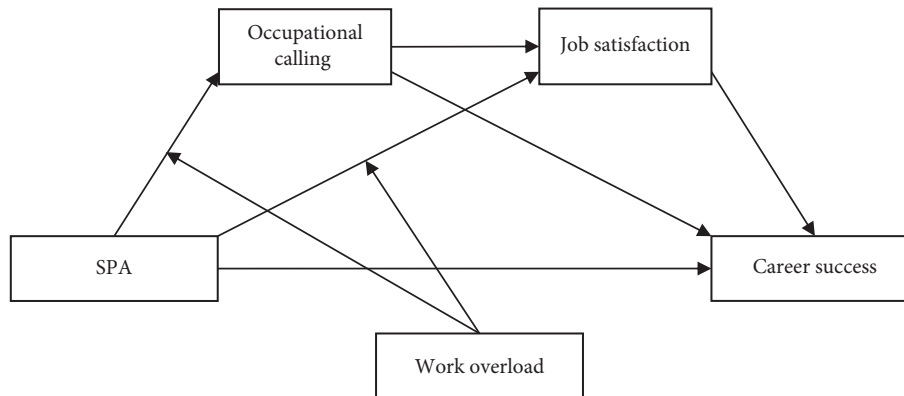


FIGURE 1: Theoretical model. SPA: sense of medical care policy alienation.

China according to the Chinese hospital management regulations [48]. Hospitals in China can be roughly divided into three levels based on their size, number of professional staff, and medical care resources available to patients [49]. First-level hospitals are grassroots hospitals that provide services to patients, focusing on disease prevention, rehabilitation, and healthcare services, which are considered basic medical services in primary healthcare institutions. Secondary and tertiary hospitals play a significant role in providing more advanced medical care, with patients accessing the majority of medical care resources at these institutions [48]. Therefore, in this study, medical staff from six secondary and eight tertiary hospitals were interviewed after obtaining consent from the hospital manager and medical staff participants.

2.2. Sample and Procedure

2.2.1. Inclusion and Exclusion Criteria. The inclusion criteria in this study were (1) working full-time in the hospital, (2) having no less than 3 years of medical work experience, (3) being 60 years old or younger, and (4) voluntarily participating in the survey after understanding the purpose of the research and signing an informed consent form. The exclusion criteria were (1) medical staff working in first-level hospitals in China, because their work content and patients are quite different from those in secondary and tertiary hospitals [48, 49], (2) part-time medical staff and medical staff rehired after retirement, and (3) medical staff with less than 3 years of full-time work experience.

2.3. Sampling Technique. To analyze the mediating effect, the required sample size depends on various factors, including model complexity, number of indicators, method used to estimate the mediating effect, and power value [50, 51]. For the model with two mediating variables, the sample size recommended in the literature is between 221 and 1000, with a median of 352 [52]. We used the sample size recommended in the literature (352) and the average value (393) from Sim, Kim, and Suh [52] simulation analysis (433) as our reference for this study. Given that we surveyed professional medical staff, we expected the questionnaire return rate to be low and

the proportion of invalid questionnaires high. To ensure at least 393 valid questionnaires, we multiplied this number by 1.5 and then rounded up to the closest integer, resulting in a distribution of 600 questionnaires. The actual questionnaire return rate and proportion of valid questionnaires exceeded our expectations, with 521 valid questionnaires. The sample of this study came from 14 hospitals in North (Changchun City), West (Chengdu City), and South China (Shangrao City and Hefei City). These 14 hospitals are classified as secondary and tertiary hospitals in China according to the Chinese hospital management regulations [48].

Hospitals in China can be roughly divided into three levels based on their size, number of professional staff members, and medical care resources that are available to patients [49]. First-level hospitals are grassroots hospitals that provide services for patients, focusing on disease prevention, rehabilitation, and healthcare services, which are regarded as basic medical care services in primary healthcare institutions. Secondary and tertiary hospitals play a significant role in providing medical care services for patients, in which patients are supposed to access most of the medical care resources [48]. After briefing the HR departments of the 14 hospitals on the value and significance of the study and ensuring the anonymity of the respondents, the departments facilitated the recruitment of participants via research assistants within their respective workgroups. For medical staff who expressed willingness to participate in the survey, the research assistant sent a WeChat link and asked them to respond online. Using the questionnaire link, the respondents independently completed the online questionnaire on their computers or mobile phones. After completing the questionnaire, the respondents received a remuneration of approximately US\$1. During the survey period, 600 questionnaire links were distributed, and 562 medical staff completed the questionnaire. Of these, 41 invalid questionnaires were excluded owing to inconsistencies, resulting in 521 valid questionnaires.

2.4. Participants. The respondents ranged in age from 25 to 60 years, with a mean age of 39.03 years (standard deviation [SD] = 7.65). There were 159 men (30.52%) and 362 women

(69.48%). A total of 415 respondents had a bachelor's degree or higher (79.65%). A total of 453 respondents (86.95%) were married, and the remaining 68 (13.05%) were unmarried or divorced. The average number of years of medical work practice for all respondents was 16.30 years ($SD=8.33$). In addition, 329 respondents (63.15%) had junior or senior professional titles, and 192 (36.85%) had primary titles. In addition to their routine work, 172 respondents (33.01%) had management responsibilities.

2.5. Ethical Considerations. This study was approved by the ethics committee of Anhui Normal University (approval number: AHNU-ET2023040), and it was conducted with the understanding and consent of the participants in accordance with the 1964 Declaration of Helsinki. Participants signed an informed consent form (or confirmed informed consent) after understanding the purpose of the study before completing the questionnaire.

2.6. Measures

2.6.1. SPA. This study used a modified, short version of the general policy alienation scale to measure SPA [32]. We modified six relevant policy items from the original scale for a medical care policy context, targeting the "powerlessness" and "meaninglessness" dimensions of the SPA of medical staff. However, we removed one item from the van Engen [32] scale because its correlation with the total score of medical care policy alienation was less than 0.3 [53]. Additionally, we included five relevant items from the policy alienation scale from Xu, Xia, and Ding [54] to measure the "implemented doubt" dimension and added one more item: "policy changes are too fast for implementers to adapt." The final SPA scale used in this study comprised 10 items, including powerlessness, meaninglessness, and implemented doubt. The responses were rated on a five-point Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree." Our scale had good construct validity ($\chi^2/df=3.755$) and a comparative fit index (CFI) of 0.970, Tucker-Lewis index (TLI) of 0.958, standardized root mean square residual (SRMR) of 0.046, and root-mean-square error of approximation (RMSEA) of 0.073, which met the recommended standards [55]. In this study, the Cronbach's α of the SPA scale was 0.832. The mean score of all items was used as an indicator of SPA among medical staff; the higher the score, the higher the SPA level.

2.6.2. OC. The OC of medical staff was measured using the presence subscale of the Brief Calling Scale [56]. This subscale contains two items that were modified for this study to be more in line with the situation of medical staff [37], including (1) "I feel a calling to be a medical staff member and do my job" and (2) "I have a good understanding of my calling as it applies to my career." The responses were rated on a five-point Likert scale ranging from 1 = "not at all true for me" to 5 = "totally true for me." This subscale has good reliability and validity and is often used in OC-related

research [43]. In this study, the Cronbach's α of the scale was 0.842. The average score of all items was used as an indicator of the medical staff's OC; the higher the score, the stronger the OC.

2.6.3. Job Satisfaction. The General Job Satisfaction Scale was used to measure the overall job satisfaction of the medical staff in this study [57]. The scale contains three items, for example, "Generally speaking, I am very satisfied with my job." The responses were rated on a five-point Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree". In this study, the Cronbach's α was 0.908. The mean value of all items was used as the index of job satisfaction; the higher the score, the higher the medical staff's job satisfaction.

2.6.4. Career Success. Six items from the financial success and work-life balance dimensions of the Career Success Scale compiled by Briscoe et al. [4] were used to measure career success in this study. These items are usually used by researchers to measure respondents' subjective career success [58]. The responses were rated on a five-point Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree." The Cronbach's α was 0.906. The mean of all items was used as an index of career success; the higher the score, the higher the medical staff's career success level.

2.6.5. Work Overload. Referring to a previous study [59], respondents were asked, "In the past month, on average, how many hours did you work per week?" Respondents chose the period specified in the questionnaire. According to China's Labor Law [60], working overtime for employees means they work more than 8 hours per day and overtime hours are limited to no more than 3 hours per day and no more than 36 h per month. Thus, medical staff should have worked a maximum of 9 hours of overtime per week, plus a normal 5-day working week of 40 h per week; therefore, medical staff can work a maximum of 49 h per week. Medical staff who worked more than 49 h per week were defined as having work overload, and those who worked less than or equal to 49 h were not considered to have work overload.

2.6.6. Control Variables. Following the recommended method [61], this study controlled for participants' demographic information, including gender, age, education level (1 = undergraduate and above, 0 = other), and marital status (1 = married, 0 = other). Since working institutions, professional titles, and work positions also have an impact on career success [1], this study controlled for the level of the medical institution where the medical staff worked (1 = tertiary hospital, 0 = secondary hospital), their professional titles (1 = intermediate and senior professional titles; 0 = other), and whether they had management responsibilities (1 = yes, 0 = no). This study also controlled for the health condition of medical staff; whether they suffered from certain chronic diseases was used as a proxy indicator of health condition (1 = yes, 0 = no).

2.6.7. Summary of Measures. To summarize, the measurement tools used in this study have high reliability and validity. We used established measurement scales, including those for OC, job satisfaction, and career success. The data analysis in this study also confirmed their excellent Cronbach's α coefficients. Additionally, we combined scales from van Engen [32] and Xu, Xia, and Ding [54] to measure SPA; after assessing its structural validity via confirmatory factor analysis, the results demonstrated that the fit index was consistent with expert recommendations [55].

2.7. Data Analysis and Model Test. This study used SPSS 25.0 and M-plus 8.0 for data analysis. We first tested for the possible risk of common method bias. Second, we analyzed the means, SDs, and correlation coefficients of the main variables. Third, we established a moderated mediation model to test the hypotheses based on the bias-corrected nonparametric percentile bootstrap method recommended by statisticians [62–64]. Specifically, we examined the direct relationship between medical staff SPA and career success (Hypothesis 1), followed by the possible mediating impact of OC and job satisfaction on the relationship between SPA and career success (Hypotheses 2 and 3), and finally the chain mediating impact of SPA \rightarrow OC \rightarrow job satisfaction \rightarrow career success (Hypothesis 4). We also tested whether work overload moderated the relationship between SPA and OC (Hypothesis 5) and between SPA and job satisfaction (Hypothesis 6) [65]. Before constructing the analysis model, the continuous variables were mean-centered [66]. For the bootstrapping analysis of chain mediating and moderating effects, the number of repeated samplings was set to 10,000 [67]. Unless otherwise specified, control variables including demographic information, job title, and management responsibilities were included in the model.

3. Results

3.1. Common Method Bias. This study may be susceptible to common method bias due to its cross-sectional design and reliance on self-reported data [68]. To address this concern, Harman's single-factor test was used to analyze the data [69]. The results showed that seven factors could be extracted based on the items used in this study. The factor with the largest explanatory power accounted for only 29.551% of the total variance, which is below the recommended threshold of 40% [69], indicating the data were not significantly affected by common method bias.

3.2. Descriptive Statistics. Table 1 presents the relationships among the means, SDs, and correlation coefficients of the variables. We found that SPA was significantly negatively correlated with career success, OC, and job satisfaction. However, a significant positive correlation was found between OC, job satisfaction, and career success.

3.3. Direct Relationship Between SPA and Career Success. The results show that SPA was significantly negatively associated with medical staff's career success ($B = -0.771$, $p < 0.001$), and the 95% confidence interval (CI) calculated using 10,000 bootstrap samples was $[-0.865, -0.671]$, which did not contain 0. This means that medical staff who experienced higher SPA tended to have a lower possibility of achieving career success; therefore, Hypothesis 1 was supported.

3.4. Relationship Between SPA and Career Success Through OC and Job Satisfaction. The results of the mediation of OC and job satisfaction on the relationship between SPA and career success are summarized in Table 2. We found that SPA was significantly negatively related to OC, while OC was significantly positively related to career success. Furthermore, the relationship between SPA and career success mediated by OC was also significant, and the 95% CI did not include 0. OC was an intermediary variable between SPA and career success among medical staff. Therefore, Hypothesis 2 was supported (Table 2 and Figure 1). Furthermore, SPA was significantly negatively associated with job satisfaction and significantly positively associated with career success among medical staff. The relationship between SPA and career success through job satisfaction was significant (95% CI = $[-0.371, -0.204]$; the CI did not contain 0). These results suggest that SPA can affect medical staff's career success via job satisfaction; thus, Hypothesis 3 was supported (Table 2 and Figure 1). In addition, this study found that the relationship between SPA and career success via OC and job satisfaction was significant (95% CI = $[-0.168, -0.079]$), indicating a chain mediating impact and supporting Hypothesis 4 (Table 2 and Figure 1).

3.5. Moderating Role of Work Overload. In addition to the aforementioned mediating role, this study hypothesized that work overload played a moderating role in the relationship between SPA, OC, and job satisfaction. First, it tested whether the relationship between SPA and OC was moderated by work overload. The results showed that after including work overload as the moderating variable and incorporating the interaction term between SPA and work overload into the equation, SPA still had a significant negative relationship with OC; however, the interaction term between SPA and work overload had no significant association with OC ($p = 0.957$). The 95% CI of the interaction term = $[-0.205, 0.204]$ contained 0 (Table 3). Therefore, Hypothesis 5 was not supported.

Second, this study examined whether work overload moderated the relationship between SPA and job satisfaction; the results are shown in Table 3. According to the results, SPA still had a significant negative relationship with job satisfaction after adding work overload and the cross-product term between SPA and work overload. The interaction term between SPA and work overload was also significant (95% CI = $[-0.466, -0.096]$), and the CI did not contain 0. This suggests that work overload can modify the

TABLE 1: Means, SDs, and correlations of the study variables.

Variable	M	SD	1	2	3	4	5	6	7	8
(1) SPA	2.93	0.61								
(2) OC	3.93	0.65	-0.38***							
(3) JS	3.71	0.82	-0.59***	0.58***						
(4) CS	3.01	0.89	-0.54***	0.47	0.67***					
(5) WOL	0.40	0.49	0.17***	-0.06	-0.16***	-0.29***				
(6) Gender	0.31	0.46	0.15***	-0.03	-0.09*	-0.18***	0.29***			
(7) Age	39.03	7.65	0.16***	0.14**	-0.03	0.04	-0.02	0.22***		
(8) Edu	0.80	0.40	0.08	-0.03	-0.07	-0.16***	0.13**	0.10*	-0.24***	
(9) MS	0.87	0.34	0.09*	0.02	-0.06	-0.07	-0.02	0.02	0.30***	-0.01

Note: $N = 521$.

Abbreviations: CS = career success, Edu = educational level, JS = job satisfaction, MS = marital status, OC = occupational calling, SPA = sense of policy alienation, WOL = work overload.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

relationship between SPA and job satisfaction. To further clarify this moderating effect, a simple slope analysis was conducted, as shown in Figure 2. The analysis revealed that when medical staff were overloaded (WOL = 1), their SPA was significantly negatively associated with job satisfaction, $B = -0.703$, $p < 0.001$, 95% CI [-0.849, -0.558]; however, when they were not overloaded (WOL = 0), their SPA also had a significant negative association with job satisfaction, $B = -0.419$, $p < 0.001$, 95% CI [-0.548, -0.287]. We constructed an indicator to determine the difference in the relationship between SPA and job satisfaction according to overloaded and nonoverloaded medical staff. The 10,000 bootstrap calculations showed that the 95% CI of this indicator was [-0.466, -0.096], and 0 was not included, suggesting a significant difference in the SPA–job satisfaction relationship between overloaded and nonoverloaded medical staff. Compared to nonoverloaded staff, the SPA of overloaded staff had a greater negative association with job satisfaction. Hence, Hypothesis 6 was supported.

In addition, we further analyzed whether work overload moderated the relationship between SPA and career success through job satisfaction among medical staff. The results showed that the relationship between SPA and career success via job satisfaction was significant for overloaded, $B = -0.350$, $p < 0.001$, 95% CI [-0.462, -0.253], and nonoverloaded medical staff, $B = -0.209$, $p < 0.001$, 95% CI [-0.300, -0.134]. To determine the difference in job satisfaction's mediating effect between the two groups, we constructed an indicator representing overloaded and nonoverloaded staff. The 95% CI of this indicator, calculated using 10,000 bootstrap samples, was [-0.244, -0.052], which did not include 0. Thus, work overload moderated the relationship between SPA and career success through job satisfaction. Thus, compared to nonoverloaded medical staff, SPA's relationship with career success through job satisfaction was greater for overloaded medical staff. The final proposed model is presented in Figure 3.

3.6. Outcomes Without Control Variables. Following the recommended analysis method [61], this study examined whether the main results would change significantly with the

absence of control variables. In the model of the SPA–career success relationship, the association remained significant without control variables ($B = -0.786$, $p < 0.001$, 95% CI [-0.875, -0.692]). In the mediation model of the association between SPA and career success with OC and job satisfaction and mediators, the SPA–career success association through OC was still significant when control variables were excluded (95% CI = [-0.110, -0.022]). Similarly, this association was also significant with the mediating role of job satisfaction (95% CI = [-0.385, -0.219]); the chain mediating impact of SPA on career success through OC and job satisfaction also remained significant (95% CI = [-0.157, -0.073]). In the moderated mediation model, work overload did not moderate the relationship between SPA and OC without control variables, but it moderated that between SPA and job satisfaction. Specifically, compared to medical staff who were not overloaded, the association between SPA and job satisfaction was greater for overloaded staff, while that between SPA and career success via job satisfaction for overloaded staff was also greater. These results are consistent with those obtained when control variables were included, indicating the results are robust [70].

4. Discussion

4.1. Primary Relationship Identified. This study demonstrated that SPA was significantly negatively associated with medical staff's career success and that OC and job satisfaction acted as mediating factors in this relationship. This is consistent with the previous literature that has indicated career success has a significant impact on medical staff's occupational outcomes, work efficiency, and role in implementing medical care policies [1, 2]. Furthermore, our results suggest career success helps medical staff manage challenges in their professional lives. Notably, the chain mediating effect in the relationship between SPA and subjective career success through OC and job satisfaction was significant [2, 3]. Work overload moderated this relationship. Additionally, the study found that work overload moderated the relationship between SPA and job satisfaction, as well as the mediating role of SPA on career success through job satisfaction; the effects were more pronounced

TABLE 2: Results of the chain mediating model.

Variables	B	SE	LL	UL	P	R ²
Mediator = OC						
SPA	-0.443	0.053	-0.548	-0.343	<0.001	0.192
Gender	-0.036	0.059	-0.154	0.078	0.535	
Age	0.020	0.004	0.011	0.029	<0.001	
Edu	0.117	0.070	-0.016	0.254	0.093	
MS	-0.022	0.104	-0.222	0.188	0.833	
LOH	0.025	0.056	-0.085	0.134	0.653	
PT	-0.042	0.061	-0.160	0.078	0.488	
SR	0.055	0.054	-0.052	0.160	0.309	
CD	-0.034	0.067	-0.172	0.093	0.609	
Mediator = JS						
SPA	-0.566	0.052	-0.667	-0.461	<0.001	0.511
OC	0.530	0.054	0.418	0.629	<0.001	
Gender	-0.033	0.060	-0.153	0.080	0.578	
Age	0.001	0.004	-0.007	0.010	0.758	
Edu	-0.018	0.071	-0.158	0.117	0.798	
MS	-0.055	0.085	-0.220	0.112	0.516	
LOH	0.023	0.055	-0.084	0.134	0.673	
PT	-0.121	0.060	-0.241	-0.004	0.044	
SR	0.025	0.058	-0.089	0.142	0.663	
CD	0.039	0.063	-0.088	0.161	0.533	
Outcome variable = CS						
SPA	-0.308	0.062	-0.431	-0.185	<0.001	0.526
OC	0.144	0.055	0.033	0.248	0.009	
JS	0.498	0.055	0.388	0.603	<0.001	
Gender	-0.221	0.068	-0.351	-0.086	0.001	
Age	0.018	0.005	0.009	0.028	<0.001	
Edu	-0.075	0.077	-0.223	0.080	0.331	
MS	-0.113	0.083	-0.277	0.049	0.171	
LOH	-0.126	0.059	-0.241	-0.009	0.033	
PT	-0.132	0.067	-0.265	0.002	0.051	
SR	-0.072	0.064	-0.196	0.054	0.259	
CD	-0.035	0.073	-0.181	0.105	0.632	
SPA → OC → CS	-0.064	0.025	-0.115	-0.016	0.012	
SPA → JS → CS	-0.282	0.042	-0.371	-0.204	<0.001	
SPA → OC → JS → CS	-0.117	0.022	-0.168	-0.079	<0.001	

Note: N = 521.

Abbreviations: CD = chronic disease, CI = confidence interval, CS = career success, Edu = educational level, JS = job satisfaction, LL = lower limit, LOH = level of hospital, MS = marital status, OC = occupational calling, PT = professional title, SPA = sense of medical care policy alienation, SPA → JS → CS = SPA impact on CS through JS, SPA → OC → CS = SPA impact on CS through OC, SPA → OC → JS → CS = SPA impact on CS through OC and JS, SR = supervisory responsibility; UL = upper limit.

TABLE 3: Results of the moderated chain mediating model.

Variables	B	SE	LL	95% CI for B	UL	P	R ²	
Mediator = OC								
SPA	-0.443	0.063	-0.566		-0.322	<0.001	0.192	
WOL	0.024	0.056	-0.083		0.133	0.670		
SPA × WOL	-0.006	0.104	-0.205		0.204	0.957		
Gender	-0.043	0.061	-0.166		0.073	0.475		
Age	0.020	0.005	0.011		0.029	<0.001		
Edu	0.116	0.070	-0.018		0.254	0.096		
MS	-0.021	0.103	-0.220		0.187	0.837		
LOH	0.023	0.056	-0.087		0.132	0.679		
PT	-0.045	0.062	-0.165		0.078	0.466		
SR	0.054	0.055	-0.054		0.160	0.325		
CD	-0.035	0.067	-0.174		0.090	0.600		
Mediator = JS								
SPA	-0.419	0.067	-0.548		-0.287	<0.001		0.526
WOL	-0.105	0.056	-0.217		0.004	0.062		
SPA × WOL	-0.284	0.093	-0.466		-0.096	0.002		
OC	0.531	0.054	0.420		0.630	<0.001		
Gender	0.009	0.062	-0.117		0.129	0.887		
Age	-0.001	0.004	-0.010		0.007	0.813		
Edu	-0.012	0.070	-0.153		0.120	0.859		
MS	-0.067	0.084	-0.231		0.096	0.422		
LOH	0.022	0.054	-0.081		0.132	0.680		
PT	-0.101	0.060	-0.220		0.016	0.094		
SR	0.033	0.057	-0.078		0.146	0.561		
CD	0.041	0.061	-0.080		0.158	0.499		
Outcome variable = CS								
SPA	-0.308	0.062	-0.431		-0.185	<0.001	0.526	
OC	0.144	0.055	0.033		0.248	0.009		
JS	0.498	0.055	0.388		0.603	<0.001		
Gender	-0.221	0.068	-0.351		-0.086	0.001		
Age	0.018	0.005	0.009		0.028	<0.001		
Edu	-0.075	0.077	-0.223		0.080	0.331		
MS	-0.113	0.083	-0.277		0.049	0.171		
LOH	-0.126	0.059	-0.241		-0.009	0.033		
PT	-0.132	0.067	-0.265		0.002	0.051		
SR	-0.072	0.064	-0.196		0.054	0.259		
CD	-0.035	0.073	-0.181		0.105	0.632		

Note: N = 521.

Abbreviations: CD = chronic disease, CI = confidence interval, CS = career success, Edu = educational level, JS = job satisfaction, LL = lower limit, LOH = level of hospital, MS = marital status, OC = occupational calling, PT = professional title, SPA = sense of medical care policy alienation, SR = supervisory responsibility, UL = upper limit, WOL = work overload.

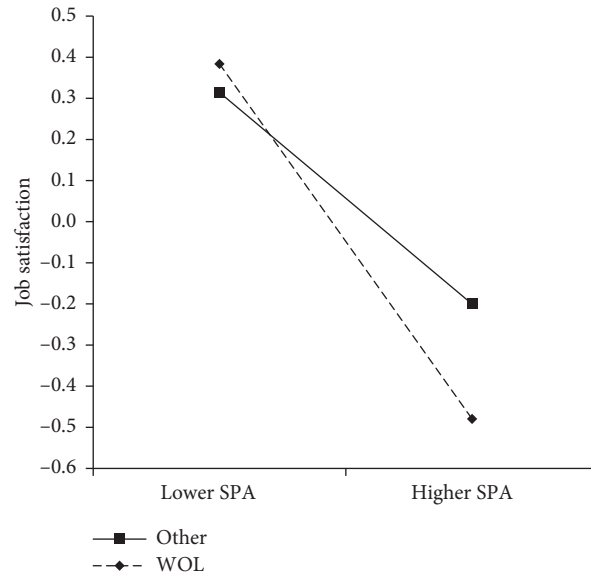


FIGURE 2: Interaction between sense of medical care policy alienation (SPA) and workload on job satisfaction.

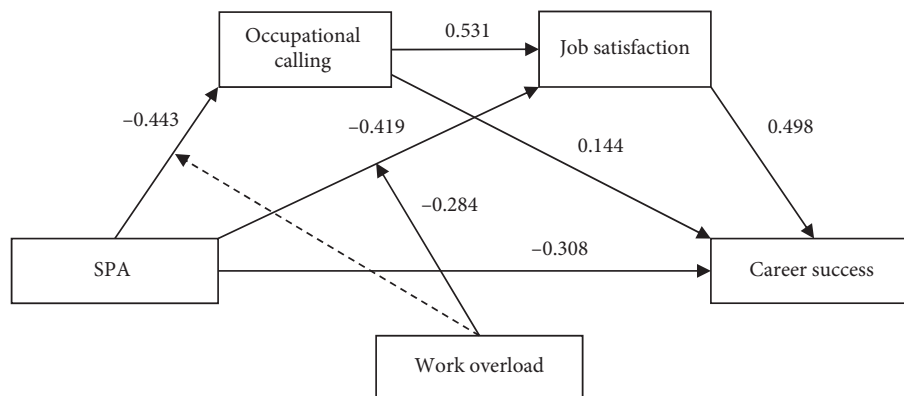


FIGURE 3: Proposed tested model. SPA: sense of medical care policy alienation.

among overloaded medical staff compared to nonoverloaded staff. This study's focus differs from that of previous studies, which have examined the impact of policy alienation on policy executors' willingness to implement social policies, job performance, work efficiency, and general well-being [37, 41, 71, 72]. We extend this research by comprehensively analyzing the conditions under which policy alienation impacts frontline policy executors, such as doctors. Our findings also differ from those of previous studies by highlighting a specific trend: medical staff's SPA is negatively associated with career success via a chain mediation mechanism involving OC and job satisfaction. While work overload did not moderate SPA's negative relationship with OC, it did moderate its relationship with job satisfaction.

4.2. Psychological Mechanisms Related to SPA and Career Success. This study identified two psychological mechanisms based on the association between SPA and career success. The first is OC: medical staff with high SPA had lower OC levels, making it difficult for them to achieve

career success [37, 41, 73]. The second mechanism is job satisfaction. Specifically, medical staff with high SPA may have lower job satisfaction, which could lead to poor career success [25, 71]. In addition, our findings support the idea that OC is associated with job satisfaction among medical staff [31, 72]. This suggests that SPA could affect career success through the chain mediating impact of OC and job satisfaction, with those with higher SPA experiencing less career success. SPA reduces medical staff's willingness to implement policies, hindering their ability to achieve career success. These findings deepen our understanding of the mechanisms underlying the impact of SPA.

In addition, this study identified conditions that may affect the degree of SPA. Specifically, we found that the relationship between SPA and job satisfaction for medical staff experiencing work overload (working over 49 h per week) was more negative than that for medical staff without work overload [18, 47, 73]. However, work overload did not affect the relationship between SPA and OC. A possible reason for this is that although work overload can lead to

physical and psychological fatigue in medical staff, it may also drive them to achieve career objectives [55, 74, 75]. These findings enhance our understanding of the conditions under which SPA interacts with high workloads among medical staff.

4.3. Burnout of Medical Staff. It is important to consider the negative impact of SPA on medical staff, particularly in relation to practical problems, such as work overload [76]. Many studies have shown that work overload among medical staff is a global issue [47, 47]. This overload often leads to burnout, which may even drive medical professionals to leave the field [77]. This study also found that work overload acts as a moderating factor, intensifying SPA's negative impact, which is consistent with existing literature highlighting that medical staff's work overload has a significant negative impact on medical staff's personal and professional well-being [45, 78]. In other words, under conditions of work overload, SPA has a stronger negative association with job satisfaction, and the mediating role of SPA on career success through job satisfaction is also strong. Given these findings, work overload among medical staff should be prioritized by governments and society as a whole [18]. We recommend medical institutions leverage information and intelligent technologies, such as artificial intelligence, to reduce workload by automating routines and repetitive tasks. This would free medical staff to focus more on patient relationships, improving their professional skills, and increasing their work efficiency [79, 80]. Medical professionals should be encouraged to devote more time and energy to communication skills, diagnosis, treatment, and rehabilitation processes rather than performing repetitive tasks [81, 82]. In addition, governments and medical institutions should minimize the management tasks of medical staff, thereby reducing their working hours, particularly over the long term [83, 84]. Establishing a mandatory resting system could also be beneficial. In cases of work overload, medical staff should be required to take rest periods before returning to work to increase their efficiency and avoid mistakes in medical services [45, 85].

5. Implications for Nursing Management

This study aimed to assess the current practices in medical care policy implementation and the impact of policy development [3]. It sheds light on medical staff management practices by understanding the nuances of medical care policy implementation [9, 86]. Promoting medical policy advocacy among medical staff is crucial. The study findings suggest that SPA among medical staff not only weakens their OC and increases their job dissatisfaction but also reduces their possibility of career success and effective work management. We recommend that the government solicit input from regular users and medical staff during the medical care policy-making process. This feedback should be incorporated into medical care policy reforms to reduce the sense of powerlessness medical professionals may experience during policy implementation process [6, 8]. Moreover, an

emerging challenge in medical care policy implementation is determining how to efficiently execute medical care policy [87, 88]. It is necessary for medical institutions to improve communication with medical staff when formulating implementation guidelines and publicizing medical care policies [78]. Enhanced communication could help medical staff better understand how to implement policies that might otherwise feel meaningless to them, thereby reducing their doubts regarding medical care implementation and lowering SPA. Finally, this study explores medical care policy implementation from various Chinese contexts, which contributes to the body of knowledge on international medical care policy management [89, 90].

5.1. Limitations. This study has some limitations that should be addressed in future research. First, as exploratory research, it utilized a cross-sectional design, limiting the ability to draw conclusions regarding the causal relationship between SPA and career success [91]. Future research should consider a longitudinal research design or experimental approach to gain a deeper understanding of this relationship and explore the potential mediating roles of OC and job satisfaction. Second, this study used short scales to measure OC and career success to increase the response rate and reduce the burden on busy medical staff. Although these short scales have high reliability and validity [92], future research should consider using complete scales to measure the constructs involved in this study. In addition, work overload was measured using self-reported working hours. Future research should explore additional workload indicators, such as the number of consultations [18]. Third, this study identified OC and job satisfaction as mediators between SPA and career success; however, the possibility of other mechanisms cannot be ruled out. Future research should continue to explore how SPA acts on career outcomes to deepen the academic understanding of its effects. Fourth, this study found that workload moderated the outcomes of SPA, with a stronger negative association with job satisfaction and career success among overloaded medical staff. Future studies should examine additional moderating variables, such as performance, to provide insight into the design of SPA interventions. Lastly, intervention research should be considered to develop appropriate programs that mitigate SPA or to lessen its impact on key outcome variables through appropriate environmental design.

6. Conclusions

If a chain mediating effect between SPA and subjective career success through OC and job satisfaction is established, it suggests that effective OC and job satisfaction can support career success even in cases wherein SPA negatively impacts career outcomes. Moreover, because work overload moderates the impact of SPA on medical staff to a certain extent, those with high work overload may be more satisfied with their jobs and have greater chances of achieving career success. Active discussion and motivation to address

medical care policy implementation issues, based on the experiences of medical staff, are essential for establishing an effective medical care policy implementation system that considers SPA among medical staff and assists them in improving job efficiency.

Data Availability Statement

The datasets generated and/or analyzed in the current study are not publicly available. The anonymized data are available upon reasonable request and subject to permission from the School of Marxism, Anhui Normal University, China, which provided financial support for the current study.

Ethics Statement

This study was approved by the Ethics Committee of Anhui Normal University (approval number: AHNU-ET2023040).

Consent

Informed consent was obtained from the study's participants in accordance with the Declaration of Helsinki (1964).

Disclosure

We declare that no other persons or third-party services were involved in the research or manuscript preparation who are not listed as authors.

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

Conceptualization, formal analysis, writing–review and editing: J.X., C.X., H.Z., and X.D.; funding acquisition, project administration: J.X.; methodology: C.X., H.Z., and J.X.; data curation: J.X., C.X., and X.D. All the authors have read and approved the final version of the manuscript.

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Research Article

Nurse Interns' Perception of Clinical Preparation and Readiness for Clinical Internship Experiences

Noura Almadani ¹, Reda M. Hables ², Jalal Alharbi ², Majed Alamri ²,
and Mukhlid Alshammari ²

¹Community and Psychiatric Mental Health Nursing Department, College of Nursing, Princess Nourah bint Abdulrahman University, Riyadh 84428, Saudi Arabia

²Nursing Department, College of Applied Medical Sciences, University of Hafr Al Batin, Hafr Al Batin 39524, Saudi Arabia

Correspondence should be addressed to Noura Almadani; naalmadani@pnu.edu.sa

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Background. As nursing interns enter challenging clinical settings, evaluating their preparation and readiness is vital for adaptation success. Sufficient real-world experience and patient care are crucial preparation components that enable effective practice and higher competencies. **Aim.** This study aimed to assess nurse interns' perception of clinical preparation and readiness for clinical internship experiences. **Methods.** A self-administered questionnaire was distributed, comprising three sections on demographics, clinical preparation requirements, and the Casey–Fink Readiness for Practice Survey. Descriptive statistics as the mean and standard deviation, numbers and percentages, linear regression model, and Pearson correlation coefficient were used for reporting normal distribution, categorical variables, and relationship between a scalar response and one or more explanatory variables and to calculate statistics between two continuous variables. **Results.** The participants were 130 nurse interns who were involved in an internship between 2016 and 2020, 50% of the nurse interns. They had a moderate level of clinical preparation, and 28.5% of them exhibited a low level. In addition, 53.8% were found to be moderately ready for practice, while 22.3% had a low level of readiness. **Conclusion.** The observed significant positive correlation between perceived preparation and readiness underscores the pivotal role of clinical preparation in influencing practice readiness. **Implications.** These findings emphasize the importance of targeted interventions aimed at enhancing clinical preparation to directly bolster overall readiness for professional practice among nurse interns.

1. Introduction

Adequate clinical preparation and readiness are vital for nursing interns entering challenging hospital environments. However, studies indicate inconsistencies in nursing students' perceived preparation, highlighting a crucial need to evaluate preparation programs [1]. As rising patient acuties increase demands on novice nurses, sufficient clinical skills and competencies determine adaptation success during role transitions from student to practicing nurse [2]. The intricacy of modern healthcare environments means nursing graduates must possess clinical reasoning, critical thinking, organizational skills, and communication capacities [3].

Given that essential skills are primarily developed through clinical placements, it is concerning that studies report discrepancies between students' perceived readiness and actual workplace readiness [4]. Determining alignment requires simultaneous investigation into multiple preparation elements including knowledge, nursing skills, critical thinking abilities, ethical comportment, and professional identity. Understanding where potential gaps exist allows educational initiatives targeting identified deficiencies. [5].

Adequate clinical preparation is vital for nursing students transitioning into demanding healthcare environments. However, research indicates inconsistencies in students' perceived readiness, highlighting a crucial need to

evaluate preparation programs [6]. Modern healthcare requires graduates have clinical reasoning, critical thinking, organizational skills, and communication capacities [5].

Clear clinical instruction assists nursing students through the transition period from student to registered, professional nurse [7]. To be competent, the nurse intern must have scientific/theoretical knowledge, particular technical psychomotor abilities, communication skills, professional values, and ethical behavior to provide care for patients in real situations [8].

Education plays a major role in the advancement of nursing discipline. Several programs, both undergraduate and postgraduate, have been developed to train nursing student. An educational program that can apply these characteristics is able to cover a large number of skills and traits that are essential in the professional environment [9].

The five-year Bachelor of Science in Nursing (BSN) program at most Saudi Arabia universities contains a mix of science and arts courses which advance nursing clinical practice and competency [10]. The program includes four years of theoretical education, and in the fifth year, a nursing internship year, which provides direct patient care experience in a healthcare setting [11].

An internship is designed to prepare the nurse intern for the different skills needed to be successful in the profession [12]. The one-year internships in Saudi Arabia rotate the nursing student through different clinical settings, including medical-surgical for pediatrics and adults, critical care in intensive care units, the emergency room, the operating room, triage area, dialysis units, labor and delivery units, and outpatient clinic [13].

Our study aimed to assess nurse interns' perceptions of their clinical preparation and readiness and examine relationships between perceived preparation and perceived practice readiness. The goal is to gain insight into the alignment between nurse interns' perceived capacities and workplace demands in order to guide educational approaches that optimize clinical preparation. Enhancing readiness aims to ease the role transition from nursing student to practicing nurse, facilitating better adaptation and competency as the next generation enters the healthcare workforce.

1.1. Research Questions

- (1) What is nurse interns' perception of clinical preparation and readiness for clinical internship experiences?
- (2) Are there significant correlations between nurse interns' perceived level of clinical preparation and their self-reported readiness for nursing practice during the internship?

2. Methods

A cross-sectional research design was utilized. This study was carried out at the College of Applied Medical Sciences, Hafr Al Batin University, Saudi Arabia.

2.1. Sampling. Participants for the study were recruited by homogeneous purposive sampling. The participants were 130 nurse interns. The study participants joined to this study according to the following inclusion criteria: the participants willing to participate in the study. The nurse interns enrolled in their internship year, which is the culmination of a graduate program consisting of a foundation year and a three-year baccalaureate program. The program also includes a mandatory 12-month internship, allowing nursing interns to gain practical experience in government hospitals.

There were 130 nurses involved in an internship between 2016 and 2020 (Table 1).

2.2. Data Collection. A self-administered questionnaire was utilized to collect data, covering aspects related to demographic characteristics, clinical preparation, and readiness for practice.

The questionnaire was translated into Arabic to ensure clarity and accessibility for participants.

Content validity was assured by a jury of 5 experts in the field of nursing management and nursing education and community health nursing.

For the first three groups (2016–2019), which represent nurse interns from the first three graduated years (2016–2019), data collection involved in-person interviews. The researcher conducted individual interviews with each nurse intern included in the study. During the interviews, participants responded to the questionnaire items, and the researcher recorded their responses to encourage interns and prevent hesitant to disclose information.

For the last year (2019–2020), researchers opted for an online data collection approach. The tools were distributed to nurse interns electronically through an online platform. The questionnaire was distributed via an official email specifically designated for nurse interns, ensuring confidentiality and targeted outreach. The response rate of 100% was calculated by dividing the number of valid responses by the total number of responses requested during interview and the number of emails replies compared to the number of emails sent.

2.3. Instruments

2.3.1. Part I: Characteristics of Nurse Interns. The characteristics of nurse interns were age, marital status, type of family, graduated year, last grade point average (GPA), what orientation program they attended, and whether it was effective.

Content validity was assured by a jury of 5 experts in the field of nursing management and nursing education and community health nursing.

2.3.2. Part II: Clinical Preparation Requirement Questionnaires. This tool was adapted from Hickey [14]. The tool comprises six components and a total of 45 items. These items are designed to evaluate the six critical components of necessary clinical preparation, namely, nursing process

TABLE 1: Characteristics of studied nurse interns ($n = 130$).

Items	N	%
Age (year)		
20–<25 years	35	26.9
25–30 years	95	73.1
Mean SD	26.09 ± 3.96	
Gender		
Female	130	100
Marital status		
Married	15	11.5
Unmarried	115	88.5
Last GPA		
<2	9	6.9
2–2.74	17	13.1
2.75–3.74	33	25.4
3.75–4.49	52	40
>4.49	19	14.6
Type of family		
Nuclear	50	38.5
Extended	80	61.5
Graduation year		
2016–2017	15	11.5
2017–2018	32	24.6
2018–2019	20	15.4
2019–2020	63	48.5
Attended orientation program		
Yes	130	100
Perception related effective of program of orientation		
Strongly agree	64	49.2
Agree	40	30.8
Disagree	20	15.4
Strongly disagree	6	4.6

steps, use of resources, psychomotor skills, teaching and information imparted, communication, and administrative aspects. Respondents rated each item on a scale ranging from (1) “not important” to (4) “essential.” The overall scale, with a possible range from 45 to 180, allowed for categorization based on importance; scores below 60 were considered of low importance, scores between 60 and 120 denoted moderate importance, and scores exceeding 120 indicated high importance.

Reliability testing was performed using Cronbach’s alpha, resulting in a value of 0.856.

Content validity was assured by a jury of 5 experts in the field of nursing management and nursing education and community health nursing.

2.3.3. Part III: Casey–Fink Readiness for Practice Survey. This scale was adapted from Casey et al. [15]. The selection of the tool is based on its utilization in previous research [16]. This tool was originally proposed by Kathy Casey and Regina Fink to measure newly licensed registered nurses’ comfort with skills over time. This part comprises 20 items distributed across four domains of readiness during an internship. The domains include clinical problem solving (7 items), learning techniques (2 items), professional identity (5 items), and trials and tribulations (6 items). Participants rated each item on a scale ranging from (1) “strongly disagree” to (4) “strongly agree.” The total scores for this scale

ranged from 20 to 80, with response categorization as follows: scores below 27 were considered of low importance, scores between 27 and 53 denoted moderate importance, and scores exceeding 53 indicated high importance.

Reliability testing was performed using Cronbach’s alpha, resulting in a value of 0.839.

Content validity was assured by a jury of 5 experts in the field of nursing management and nursing education and community health nursing.

2.4. Pilot Study. A pilot study was conducted with 13 nurse interns, representing 10% of the study cohort, to assess the construction and clarity of the tool. This pilot study also aimed to determine the time required for each participant to complete the questionnaire. The tools proved to be clear, and no modification was needed.

2.5. Statistical Analysis. Data were analyzed via the Statistical Package for Social Science (SPSS) software, version 23 (SPSS Inc. Chicago, IL, USA). Descriptive statistics as the mean and standard deviation were used for reporting normally distributed numerical variables. Numbers and percentages were used to describe categorical variables. A linear regression model was used to assess the relationship between a scalar response and one or more explanatory variables. The Pearson correlation coefficient was used to calculate statistics between two continuous variables.

2.6. Ethical Considerations. Institutional Review Board (IRB) approval was obtained from the local authoritative body. Written informed consent was obtained before data were collected during interwire or via an official email. Each nurse intern was knowledgeable about the aim of the study before participation. They were informed that their participation in the study was elective, and they had the decision to refuse participation at any time of the study without penalties. All patients’ data were confidential and used only for research purposes.

3. Results

Table 1 provides sociodemographic details of participating nurses. The mean age of the nurses was 26.09 (SD = 3.96) years, and all participants were female. The majority were unmarried, with two fifths (40%) holding a GPA of 3.75–4.49. In addition, all nurses attended orientation programs, with approximately half (49.2%) of them strongly agreeing on the effectiveness of their respective programs.

According to readiness for practice, Table 2 revealed that clinical problem-solving had the highest mean percentage at 70.5%, with a mean score of 19.745 ± 3.61 . In contrast, the lowest-scoring domain was trials and tribulations with a mean score of 4.23 ± 1.01 , with mean percentage 52.9%.

Regarding to the importance of clinical preparation, Table 3 detected that the mean score for the steps of the nursing process was 36.82 ± 9.76 , representing the lowest mean percentage at 41.8%. In addition, the mean score for the use of resources was 3.86 ± 0.98 , and for teaching and information giving, it was 19.56 ± 6.60 . On the other hand, communication skills had a mean score of 13.51 ± 4.49 , with the highest mean percentage of 84.4%. Administrative skills had a mean score of 10.11 ± 1.95 , accounting for 50.6%, as mentioned in Table 4.

Table 4 displays the results of the multiple linear regression model examining the perception related to clinical preparation requirements. The model shows a slight but significant fit, as indicated by the F-test value of 11.965 with a p value of 0.002. Approximately, 51% of the variation in clinical preparation requirements is explained by this model, as reflected by the R^2 value of 0.511.

Moreover, the analysis suggests that an increase in age by one unit is associated with a corresponding increase in perception related to preparation requirements by 0.169. Similarly, an increase in GPA by one unit is linked to a higher perception, showing an increment of 0.355. Notably, nurses who graduated in 2019 and 2020 demonstrated a higher perception compared to those who graduated in 2016-2017.

Table 5 illustrates that the multiple linear regression model for the Casey-Fink Readiness for Practice Survey indicates a statistically significant fit, as evidenced by the F-test value of 9.863 with a p value of 0.004. This model accounts for approximately 54% of the variation in the Casey-Fink Readiness for Practice Survey, as denoted by the R^2 value of 0.540.

The findings further reveal that an increase in GPA by one unit is associated with a corresponding increase in study subjects' readiness by 0.398. In addition, unmarried interns exhibit a higher level of readiness compared to married interns, with a difference of 0.171. Moreover, an increase in the perception of the orientation program by one unit is linked to an increased readiness by 0.189, see more in Table 6.

Table 6 shows that there was a highly significant correlation between the readiness for practice and clinical preparation requirements at p value <0.01 .

Figures 1 and 2 show that 50% of nurse interns had a moderate level of clinical preparation, and 28.5% of them exhibited a low level. In addition, 53.8% were found to be moderately ready for practice, and 23.90% had a highly ready for practices, while 22.3% had a low level of readiness.

4. Discussion

Navigating the shift from being a nursing student to a nurse intern is often difficult. Assessing how equipped students are for workplace demands can ease the transition process. Intern readiness to deliver secure, skilled care is an urgent issue because of rising workloads and elaborate healthcare frameworks. Ramifications of unsatisfactory preparation during this move can be examined both individually and organizationally. The effect of inadequate preparedness

TABLE 2: Readiness for practice among studied intern nurses ($n = 130$).

Items	Mean score	Mean percent
Clinical problem solving	19.745 ± 3.61	70.5
Professional identity	11.03 ± 2.50	55.2
Learning techniques	12.97 ± 4.02	54.04
Trials and tribulations	4.23 ± 1.01	52.9

TABLE 3: Clinical preparation requirements for intern nurses ($n = 130$).

Items	Mean SD	Mean percent
Communication skills	13.51 ± 4.49	84.4
Teaching and information giving	19.56 ± 6.60	69.9
Psychomotor skills	12.88 ± 4.07	64.4
Administrative skills	10.11 ± 1.95	50.6
Uses of resources	3.86 ± 0.98	48.2
Step of nursing process	36.82 ± 9.76	41.8

during transition can be viewed from the personal and from the system level.

Regarding readiness to practices, this study found that the highest mean percentage (70.5%) of new nurses felt most ready to practices regarding the domain of clinical problem solving. While, 52.9% of them they felt that the least read to practices regarding the domain of trials and tribulations.

These results are incongruent with [17], who reported that final-year undergraduate nursing students in a school in the Republic of Ireland are concerned about their readiness for practice. While Aswad et al. [18] revealed that only one quarter of study participants were highly ready.

Regarding specific clinical preparation skills, the current study revealed that communication skills were the strongest area reported with a mean percentage of 84.4%. However, applying the full nursing process and knowing how to utilize informational resources were relative reported weakness with a mean percentage of 41.8%. These results cohort with the study by Abdelkader et al. [19] who found that the highest scores for educational preparation requirements was in teaching and information giving, psychomotor skills, and communications skills (79.70%, 78.82%, and 76.92%, respectively). Furthermore, another study [20] reported that the majority of nurse interns (a mean percent of 50.6%) needed training in managerial skills. Nicholls [21] stated that both psychomotor and nursing process skills were extremely important requirements for clinical preparation assignments.

The study findings revealed that there was a highly significant correlation between the readiness level and perceived preparation requirements also underscores the importance of alignment. Nursing schools must adequately equip students for the real demands of clinical practice. Meanwhile, healthcare institutions must recognize the limitations of novice nurses and support their competent acclimation to the provider role. These results, similar to the study by Babaei et al. [22], found that there was a positive and significant correlation between nurses' attitudes and

TABLE 4: Best fitting multiple linear regression model for perception related to clinical preparation requirements.

	Unstandardized coefficient		Standardized coefficient	T test	p value
	B	Std. error			
Age	0.169	0.209	0.189	5.017	0.011
Last GPA	0.355	0.321	0.246	7.894	0.007
Graduated year	0.197	0.187	0.199	6.102	0.009

TABLE 5: Best fitting multiple linear regressions model for Casey–Fink Readiness for Practice Survey.

	Unstandardized coefficient		Standardized coefficient	T- test	p value
	B	Std. error			
Last GPA	0.398	0.257	0.157	4.135	0.010
Marital status	0.171	0.199	0.142	3.996	0.022
Perception related effective of orientation program	0.189	0.196	0.172	3.746	0.024

TABLE 6: Correlation between clinical preparation requirements and Casey–Fink Readiness for Practice Survey.

	Casey–Fink Readiness for Practice Survey
Clinical preparation requirements	<i>r</i> . 0.598 <i>p</i> 0.001

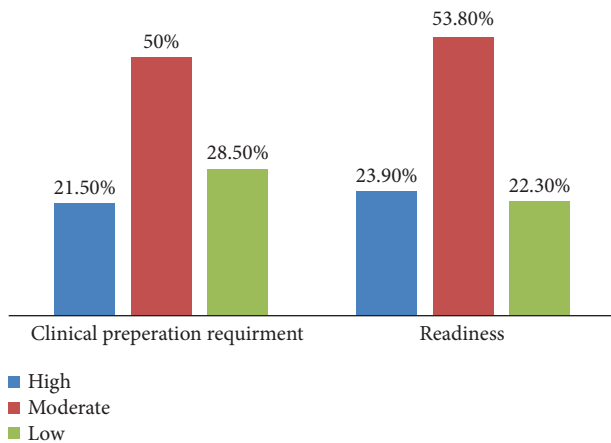


FIGURE 1: Distribution of nurse interns-related clinical preparation and readiness for practice (n = 130).

readiness. In addition, Ahmadi et al. [23] recommended that the clinical preparation of nursing students during the internship program enhances clinical readiness in internships.

The regression models provide further insight into factors impacting nurse interns’ preparation and readiness for practice. This study revealed a slight but significant fit relationship, as indicated by the F-test value of 11.965 with a *p* value of 0.002, which indicate that older nurse age and higher nursing GPA were associated with greater perceived preparation requirements and overall readiness levels. Similarly, an increase in GPA by one unit is linked to a higher perception, showing an increment of 0.355. These results go online with the study by [24] who detected that age ($\beta = 0.029$, $SE = 0.012$, and $p = 0.021$) and employment

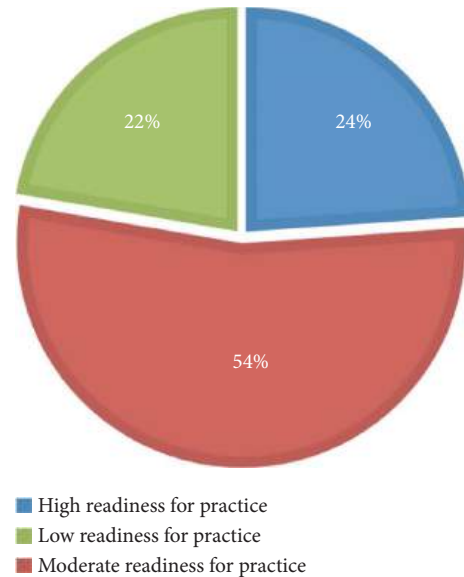


FIGURE 2: Distribution of nurse interns-related readiness for practice (n = 130).

orientation duration ($\beta = -0.007$, $SE = 0.003$, and $p = 0.018$) were statistically significant factors influencing role transition experience among newly joined nurses. In addition, Alshammari et al. [25] mentioned that the GPA of nurse interns had a positive correlation on perception and adaptation during the training program, and Kaur [26] reported the importance of developing a positive interpersonal relationship with patients in nursing practice.

Furthermore, nurse interns more recently in 2019-2020 felt better prepared than those from 2016 to 2017. Notably, nurses who graduated in 2019 and 2020 demonstrated a higher perception compared to those who graduated in 2016-2017. Marital status and orientation program quality also appeared to influence readiness. Likewise, a study by Ahmed et al. [27] revealed that the marital status had no relation to nurse intern performance.

Also, Harrison et al. [28] found that an effective orientation program had a positive effect on increasing the standard of care.

On the other hand, Sharma et al. [29] stated that there was no association between nurse intern clinical competence and their satisfaction with an internship program.

With careful attention to rounding out nursing curricula, standardizing orientation programs, and bridging the transition into practice, new nurses' high levels of clinical knowledge can be translated into comprehensive readiness. This will empower them to deliver excellent care while building confidence in their evolving skills. At this context, Babamohamadi et al. [30] mentioned that the knowledge level of nurses' interns improves their readiness to the clinical situations. Also, Permana et al. [31] demonstrated a statistically significant correlation between students' caring conduct and clinical preparation.

4.1. Implication for Practice. Providing ongoing professional development opportunities for nurse interns can contribute to the continuous improvement of their skills and readiness. Encouraging collaboration between nursing education programs and healthcare institutions can foster a seamless transition from education to practice. Establishing mentorship programs can provide invaluable support for nurse interns.

4.2. Strength and Limitation. The strength of this study was the selection of topics related to perceived preparation and readiness of nurse internees. One of the limitations of this study was related purposive sampling technique. Further studies with more sample size using the randomized sampling technique needs to be conducted for large size of participants and different colleges in Saudia Arabia.

5. Conclusion

In conclusion, the study reveals that a substantial proportion of nurse interns, precisely half, displayed a moderate level of clinical preparation, while over one-quarter exhibited a low level. In addition, more than half of the interns were deemed moderately ready for practice, with over one-fifth categorized as having a low level of readiness. The observed significant positive correlation between perceived preparation and readiness underscores the pivotal role of clinical preparation in influencing practice readiness. These findings emphasize the importance of targeted interventions aimed at enhancing clinical preparation to directly bolster overall readiness for professional practice among nurse interns.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Nurse Manager Practice Environment and Its Influencing Factors: A Multicenter Cross-Sectional Study

Yushuang Chen , Xifei He , and Qinghua Liu

Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China

Correspondence should be addressed to Xifei He; xfhjtjhp@163.com

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Objective. This study aimed to evaluate the current status and related factors of practice environments of nurse managers in China. **Background.** Insufficient nurse staffing and poor working environment directly increase the burnout and turnover of nurse leaders. Nurse managers play a pivotal role in healthcare organizations, and their performance has been inextricably linked to achieving optimal patient, staff, and healthcare organizational outcomes. However, there are few studies exploring the influencing factors of nurse manager practice environment. **Methods.** A cross-sectional study was undertaken to examine a sample of 405 nursing managers who were selected from 10 hospitals located across three provinces in China. The general characteristics questionnaire, the Nurse Manager Practice Environment Scale, the Perceived Stress Scale, and the Career Growth Scale were used. Data were analyzed by descriptive statistics, univariate analysis, and multiple stepwise linear regression. **Results.** The total scores of the nurse manager practice environments were 236.71 ± 27.635 (with 270 being the highest possible score), which was at a generally high level. The three lowest scores were adequate budgeted resources, fair and manageable workload, and nurse manager-physician relationships. Nurse manager practice environment was predicted by hospital geographic location, having (or not) training experience in higher ranked hospitals, levels of perceived stress, and career growth scores. **Conclusion.** Chinese nursing managers reported a relatively favorable nursing practice environment. Policymakers should pay more attention to the practice environment of nursing managers in small city hospitals, and they could regularly evaluate, monitor, and promote practice environment determinants that are sensitive to disparities between different hospitals. In addition, hospital managers can take action by implementing diversity training programs, developing stress-reduction initiatives, and creating robust career development programs for nurse managers to support nurse managers better. **Implications for nursing management:** a better understanding of the current practice environment of nursing managers is beneficial for improving nursing managers' work environment, which in turn will promote the quality of care delivered and nursing management work. For nurse managers, the characteristics of the management and work environment of the small city hospitals should be benchmarked and learned against the district capital hospitals. Also, hospital administrators were required to adopt strategies to foster psychological support of nurse managers and create pathways and opportunities for professional growth to create a supportive working environment.

1. Introduction

In the context global scarcity of nurses, recruiting and retaining nurse managers (NMs) have become a significant challenge [1]. The anticipated vacancy of NMs is alarming, as most NMs are about to retire or resign due to job burnout and dissatisfaction based on baby boomer retirement in the United States [2]. Recent studies have revealed that nurse managers (NMs) have

a central role in healthcare organizations, and their performance has been inextricably linked to achieving optimal patient and staff nurse outcomes [3, 4]. Compelling evidence in Saudi, Thailand, and China suggests that improving the quality of the nursing practice environment is considered an important strategy for dealing with the nursing shortage [5–8]. Thus, efforts to improve nurse retention rates must take into account the key role of nurse managers [4].

A good practice environment for NM can stimulate work enthusiasm and promote leadership, which will, in turn, create an environment conducive to supporting nursing staff [9]. Previous studies have been mainly conducted on the practice environments of staff nurses; however, the critical role of nurse managers is ignored [10, 11]. The nurse manager practice environment (NMPE) has been defined as the organizational environment that supports nurse manager practice and influences nurse, patient, and organizational outcomes [12]. Different from the nursing practice environment, NMPE mainly focuses on the role of NMs. Researchers found that the recognition of nurse managers' working environment differs from that of staff nurses [13]. Besides, NMs are indispensable in influencing the professional practice environment of frontline nurses. Thus, it is important to understand the current situation of NMPE. Ensuring a supportive work environment for NMs is the key to retaining these individuals in their roles [14]. Studies also showed that a positive practice environment is critical to job satisfaction, retention, and work performance for NMs [13]. Therefore, nurse managers' work environments warrant the attention of hospital administrators to achieve good workplaces where nurses can focus on patient care.

The established associations between the NMPE and nursing outcomes motivate research to understand the predictors of the NMPE. It is essential to consider a broader range of individual, psychological, and organizational factors, given that the work environment encompasses physical and psychosocial dimensions [12]. Regarding individual factors, there is controversy over the influence of some demographic factors, and more factors remain to be learned. It was reported that sociodemographic differences were considered necessary in evaluating the NMPE [15]. Overall, existing studies indicate the correlation between NMPE with some demographic variables, such as marital status, age, and education [13, 15–17]. Research indicates that hospital characteristics such as location were a significant variable in nurse staff's perception of the practice environment. However, there has been no research exploring the variable among nurse managers.

Few studies have analyzed the associations between nursing managers' perceptions of the practice environment from psychological perspectives. There is growing evidence that mental stress is associated with the practice environment in nurses [18, 19]. Occupational stress is considered a significant factor that negatively influences the practice environment [20]. Nurse managers work in a practice environment that reflects all-day responsibility and often unmanageable workloads, leading to high-stress levels [21]. Previous studies conducted with nursing staff showed that mental strain may affect their self-assessed working environment and the quality of care [18, 22]. Studies revealed that stress has a negative influence on NMPE [17, 23]. However, the abovementioned conclusions stem from a qualitative study and using universal measurement tools. Many findings focus on the staff nurse; the relationship between psychological stress and perceived work environment among NMs still needs further research.

Moreover, recent studies showed that the NMPE is more strongly impacted by organizational characteristics factors such as career development and promotion [4]. Considering the significance of nurses' professional development in assessing the caliber of the nursing practice environment, additional research is required to examine the influence of career development on the working environment of NMs. When organizational characteristics (ongoing development) support NMs' practice, they are more satisfied with their work environment [14, 21, 24]. Career growth is defined as the promotion and development of individual professional ability in the organization and contains career goal, career ability, and career opportunity [25]. It was reported that career development opportunities were the predictors of nurses' work environment [26]. However, there is a lack of evidence that describes career growth in relation to the NMPE.

The importance of nurse managers' practice environments in influencing nursing turnover, direct care, and patient outcomes has been thoroughly studied [17, 27, 28]. The current situation and influencing factors of the NMPE remain to be learned to make international comparisons. Prior studies have been mainly focused on the practice environments of clinical nurses; there is a lack of studies evaluating practice environments from the viewpoint of NMs [11, 28]. Besides, there have been no previous studies that have examined factors influencing NMPE from the perspective of psychological and organizational characteristics using quantitative research. Therefore, the present study aims to investigate the current status of the practice environment and its associated factors among nurse managers in China and to find the aspects that need to be improved the most.

2. Methods

2.1. Design and Sample. This was a multicenter cross-sectional study performed in August, 2023, in 10 hospitals in Hubei, Shanxi, and Jiangxi provinces in China. A multicenter cross-sectional study was conducted on nurse managers from 10 hospitals across three provinces (Hubei, Shanxi, and Jiangxi) in the central, northern, and southern areas of mainland China. Of the ten hospitals, four are tertiary hospitals located in the provincial capitals Wuhan, Taiyuan, and Nanchang. The remaining six secondary hospitals are located in smaller cities, namely, Suizhou, Shiyan, and Enshi. Cross-sectional designs help determine the current situation of the practice environment for nursing managers and analyze the impact of multiple factors simultaneously, as represented by a study sample. The target population of this study was inpatient and outpatient nurse managers with at least 12 months of experience in the nurse manager role. The study population includes hospitals from provincial capitals such as Taiyuan, Nanchang, and Wuhan, as well as prefecture-level cities such as Suizhou, Shiyan, and Enshi. The convenience sampling method was used in this study. A snowball methodology was used in a convenience sample identified by the director of the Nursing Department, the

chief nurse of internal medicine department, and the head nurses. The author confirmed and contacted the nursing department directors and head nurses of 10 hospitals, forwarded the online questionnaire to nursing managers of each hospital, and asked them to voluntarily fill it out. The inclusion criteria were (a) first-line registered nurse manager (head nurse or nursing supervisor) on duty; (b) having worked as nurse manager for more than one year; and (c) having volunteered to participate and provided informed consent. The exclusion criteria were (a) serving in an interim role and (b) nurse managers in administrative positions without managing any patient care areas. In terms of sample size estimation, G Power 3.1 software was used to calculate the sample size needed for this study. The linear multiple regression algorithm was selected. There were 24 variables in this study, including 11 sociodemographic characteristics and 13 scale-associated dimensions. With 95% confidence intervals and 0.8 power, the minimum sample size in our study was 169. Considering a possible 20% wastage rate, a total of 212 participants were needed.

2.2. Instrument

2.2.1. General Characteristics Questionnaire. The general characteristics that the questionnaire mainly investigated were the nurse managers' gender, age, marital status, highest education, hospital grade, hospital geographic location, professional title, working years, weekly working hours, teaching work experience, and whether they have training experience in higher ranked hospital.

2.2.2. The Nurse Manager Practice Environment Scale, NMPES. NMPES was designed to describe and assess nurse managers' practice environments by Dr Warshawsky and the Chinese version of NMPES had undergone cross-cultural debugging and validation [29, 30]. NMPES contains 45 items, with a total of 8 dimensions: (1) empowering administrative leaders to create a culture of patient safety (a blame-free environment with established lines of responsibility and accountability), (2) nurse manager-director relationship, (3) culture of generativity (the organization supports ongoing development of nursing leaders), (4) adequate budgeted resources, (5) culture of meaning (the organization's mission and vision are aligned with the organization's mission and vision), (6) NM-physician relationships, (7) NM-unit staff relationships, and (8) fair and controllable workload. Items are measured on a six-point Likert scale ranging from 1 = "completely disagree" to 6 = "completely agree". Scoring is based on the mean score for the overall scale and mean scores of the subscales. Mean scores close to 6 and 1 suggest that the practice environment is positive or negative (poor), respectively. The higher the score, the better the working environment of the nurse manager. The Chinese version of NMPES has a Cronbach's α of 0.917, retest reliability was 0.968, split-half reliability was 0.952, and Content validity was 0.96. The NMPES has a Cronbach's α of 0.917 in our study.

2.2.3. Perceived Stress Scale, PSS. PSS is a widely used psychological stress measurement tool. It was developed by DR Cohen and the Chinese version of PSS was translated and validated [31, 32]. It contains 14 items, 2 dimensions, i.e., perceived stress (7 items) and perceived coping ability (7 items), and uses a five-point Likert scale ranging from 0 = "never" to 4 = "always". The total score on the scale is 0–56 points, and the higher the score, the higher the occupational stress level. The Chinese version of PSS has a Cronbach's α of 0.78 and a validity coefficient of 0.73, indicating good reliability and validity.

2.2.4. Career Growth Scale, CGS. CGS was developed by Weng and Xi [33] and contains 15 items with 3 dimensions, namely, career goal, career capacity, and career opportunity. It uses a five-point Likert scale ranging from 1 = "no match at all" to 5 = "very high match"; a higher score indicates a higher level of professional growth status. The CGS has good internal consistency, with Cronbach's α of 0.926 for the total scale. Also, CGS was proven to be acceptable, valid, and reliable for the evaluation of nurse career growth in Chinese hospitals [25].

2.3. Data Collection and Ethical Considerations. A total of 5 participants were recruited to fill out the online survey questionnaire and provide feedback to ensure that the questionnaire can be understood without difficulty. The online questionnaire link was forwarded to the social media group by the nurse directors or head nurses of each hospital, as requested by the researcher. Participants received the link and were voluntary to fill out the questionnaires on the website platform. If the participants were interested in the study, they could visit the questionnaire and receive a study description at the beginning of the survey via the online link. Participants were required to read and sign an informed consent form before filling out the questionnaire. Only when the participants voluntarily click agree, can they continue to complete the questionnaire survey content. All participants in the survey were anonymous and voluntary, and they were allowed to withdraw from the study at any time. Questionnaires with a filling time of less than 120 seconds were considered invalid questionnaires and were excluded, according to the preliminary experimental results. Two researchers independently exported the results into Microsoft Excel format, checked them, and then imported them into the SPSS software. This study was approved by the Institutional Ethics Review Board of the Tongji Hospital, Tongji Medical Department, Huazhong University of Science and Technology (TJ-IRB20230845).

2.4. Statistics Methods. The data were analyzed by using SPSS 26.0. The measurement data all following a normal distribution were described by means and standard deviations. The counting data were described by frequency and percentage. This study used *t*-tests or one-way ANOVA to compare the differences in the practical environment of different groups of nurse managers. Pearson correlation

analysis was used to analyze the correlation between nurse manager's practice environments and perceived stress and career growth. Multiple linear regression analysis was used to analyze related factors. The statistical significance was defined as $P < 0.05$.

3. Results

3.1. Demographics of the Participants. A total of 446 participants were recruited, 405 (90.8%) were valid for analysis. Most of the participants were from the level III hospital (83.7%), located in the district capital (69.6%), female (95.7%), and 31–45 years old (70.6%). Over 60% of the participants had more than 15 years of job experience. Married nursing managers accounted for 93.8% of the participants. As for highest education, 84% of the nursing managers had bachelor's degrees, and only 3.7% of the study samples were in junior college or below. Participants with supervisor nurse and associate professor of nursing or above position titles accounted for 60% and 33.8% of the sample, respectively. In terms of weekly working hours, only 9.9% of participants had 40 hours or less per week; most of the participants had 41 to 59 hours per week. Over 50% of the participants had training experience (Table 1).

3.2. Scores of Nurse Manager Practice Environment. The total scores of the investigated nurse manager practice environments were 236.71 ± 27.635 , which was at a favorable level, and the specific scores of dimensions are presented in Table 2. NM-unit staff relationships, culture of meaning, and culture of generativity were marked highly, while comparatively lower scores were adequate resources, fair and controllable workload, and NM-physician relationships. In terms of the specific item, the highest-scored item was "maintaining a reputation for excellence is important to the hospital leaders (4.26 ± 1.387)", and the lowest-scored item was "the budget allocations for my patient care area(s) are adequate (5.77 ± 0.509)".

3.3. Factors Related to Nurse Manager Practice Environment. Independent sample *t*-tests and one-way ANOVA indicated that the total scores of nurse manager practice environment differed significantly among nurses of different hospital grade, hospital location, age, weekly working hours, and further education/training experience ($P < 0.05$) in Table 3.

Furthermore, the results in Table 4 show that the perceived stress score and career growth score had a significant correlation with nurse manager practice environments ($P < 0.05$). Also, the perceived stress and career growth of the nurse managers are at a moderate level. For perceived stress, the highest dimension score was the ability to cope with stressor (mean, 11.39 (SD, 5.28)). The lowest dimension was general stress (mean, 10.70 (SD, 4.29)). For career growth, the highest mean subscale score was career capability. The lowest mean subscale score was career opportunities (Table 4).

3.4. Multivariate Analyses of Nurse Manager Practice Environment Scores. A multiple linear regression model was used to avoid confounding factors, and variables that had a significant correlation with the nurse manager practice environment in the one-way ANOVA were taken as independent variables. Also, the stepwise introduction method was introduced into the corresponding regression equation. According to the results of the regression analyses, general stress, career growth, career opportunity, hospital location, and further education/training experience explained 58.6% of the total model variance (Table 5).

4. Discussion

This study was a multicenter cross-sectional study that examined the status and influencing factors of the nurse manager practice environment. The results showed that Chinese nursing managers reported a relatively favorable nursing practice environment, but the scores on subscales such as adequate budgeted resources, fair and manageable workload, and NM-physician relationships were still low. The results of the study showed that nurse managers working in hospitals located in small cities, with training experience in higher-ranked hospitals, higher levels of perceived stress, and poor career growth reported higher ratings of their practice environment.

The total score of the nurse manager practice environment was 236.71 (SD, 27.635) (where 270 was the highest possible score). The participants in this study reported a generally high level, which is marginally higher than the total score of NMPES reported in a previous study in China, i.e., 190.35 (SD = 14.66) and 216.13 (SD = 29.42) [30, 34]. These findings are consistent with research showing that NMPES scores were overall reported as moderate [27, 35]. Warshawsky's study reported a moderate to moderately high level among NMs with the same scale in the United States [36]. A survey in Finland showed that NMs experienced more negative perceptions of the practice environment [17]. The possible reason for these differences in results may be different investigation times and areas. We compare the results of the practice environment in pre-pandemic studies [30, 37], and the results showed some positive changes in the nurse manager practice environment. In the recovery and reconstruction process after the epidemic, a healthy working environment is an important component of our stable nursing team. Within the pandemic environment, managers may feel unsupported with their practice environment [35]. The results of the study indicate that the improvement of the nurse manager practice environments has been achieved. From a policy perspective, the Chinese government introduced a series of relevant policies to ensure the development of the nursing team from various aspects, providing a strong policy foundation for it. For instance, in the National Nursing Development Plan of the China (2021–2025), the importance was stressed to strengthen the construction and development of nursing teams, which optimizes the practical environment for nursing managers.

With regards to the subscales of NMPES, the findings showed that the adequate budgeted resources subscale had

TABLE 1: Sociodemographic data of the investigated nurse managers.

Variables		N = 405/means	Percentage/standard deviation
Hospital grade	Grade II hospital	66	16.3
	Grade III hospital	339	83.7
Hospital geographic location	District capital	282	69.6
	Small city	123	30.4
Gender	Male	17	4.2
	Female	388	95.8
Age (years)	≤30	13	3.2
	31–45	286	70.6
	>45	106	26.2
Working years	<5	6	1.5
	6–10	35	8.6
	11–15	103	25.4
	>15	261	64.4
Marital status	Married	380	93.8
	Unmarried	13	3.2
	Widowed/divorced	12	3.0
Highest education	Junior college or below	15	3.7
	Bachelor's degree	340	84.0
	Master's degree and above	50	12.3
Position title	Senior nurse	25	6.2
	Supervisor nurse	243	60
	Associate professor of nursing	130	32.1
	Professor of nursing	7	1.7
Weekly working hours(h)	≤40	40	9.9
	41–59	311	76.8
	≥60	54	13.3
Training experience in higher ranked hospitals	Yes	226	55.8
	No	179	44.2

TABLE 2: Scores of the NMPES.

Variables	Total score (mean ± SD)	Mean score (mean ± SD)	Rank
Nurse manager practice environment (45 items)	236.71 ± 27.635	5.26 ± 0.614	—
Adequate budgeted resources (4 items)	18.19 ± 4.227	4.54 ± 1.056	8
Fair and manageable workload (4 items)	19.84 ± 3.723	4.96 ± 0.931	7
NM-physician relationships (3 items)	15.95 ± 2.179	5.31 ± 0.726	6
Empowering organizational culture of patient safety (15 items)	79.88 ± 9.251	5.32 ± 0.616	5
NN-director relationship (6 items)	32.04 ± 4.475	5.34 ± 0.745	4
Culture of generativity (6 items)	21.92 ± 2.479	5.39 ± 0.659	3
Culture of meaning (4 items)	21.92 ± 2.479	5.47 ± 0.619	2
NM-unit staff relationships (3 items)	16.52 ± 1.803	5.50 ± 0.601	1

the lowest mean (SD) score (4.5 [1.1]), whereas NM-unit staff relationships were the subscale with the highest mean (SD) score (5.5 [0.6]). Overall, these findings are in accordance with findings reported by previous studies [13, 27, 35, 36]. They have demonstrated that the rational allocation and use of resources have become an important and common issue in the context of insufficient personnel and high workload and hospital leaders should align resources to support the creative work of nurse managers. Fair and manageable workload is also a prominent issue in the results of NMPES scores since the score is second only to the adequate budgeted resources. A qualitative study showed that none of the nurse managers reported satisfaction with their workload or work-life balance [38]. Similarly, it is

reported that nurse managers experienced significant work pressure, which increases their workload and working hours than other nurse staffs [39]. The results of this study show that a lack of resources and excessive workload were hindering factors that challenged nurse managers' practice environment. The item "the budget allocations for my patient care area(s) are adequate" resulted in the lowest score among all items, reminding us that in the context of poor staffing; managers still face the challenge of improving the level of nursing human resource allocation and achieving dynamic and reasonable allocation of human resources. Healthcare organizations and hospital senior administrators play an important role in promoting a healthy professional practice environment in NMs. Hospital managers should

TABLE 3: Scores for NM PE with different demographic characteristic.

Variables		Overall scores for nursing manager practice environment (mean \pm SD)	t/F value	P value
Hospital grade	Grade II hospital	223.30 \pm 34.977	4.404	0.001*
	Grade III hospital	239.32 \pm 25.212		
Hospital geographic location	District capital	240.17 \pm 23.817	3.882	0.001*
	Small city	228.77 \pm 33.636		
Gender	Male	234.71 \pm 23.984	-0.305	0.761
	Female	236.79 \pm 27.808		
Age (years)	≤ 30	226.31 \pm 45.256	3.042	0.049*
	31-45	238.78 \pm 26.704		
	>45	232.40 \pm 26.925		
Working years	<5	239.83 \pm 30.564	0.054	0.984
	6-10	236.66 \pm 37.421		
	11-15	235.99 \pm 30.940		
Marital status	>15	236.92 \pm 24.690	2.542	0.080
	Married	237.50 \pm 27.476		
	Unmarried	224.62 \pm 28.915		
Highest education	Widowed/divorced	224.75 \pm 27.854	0.887	0.413
	Junior college or below	227.67 \pm 30.745		
	Bachelor's degree	236.88 \pm 28.112		
Position title	Master's degree and above	238.26 \pm 23.053	0.361	0.781
	Senior nurse	233.68 \pm 35.725		
	Supervisor nurse	237.59 \pm 27.475		
	Associate professor of nursing	235.36 \pm 26.199		
Weekly working hours(h)	Professor of nursing	241.71 \pm 31.245	3.087	0.047*
	≤ 40	239.68 \pm 26.185		
	41-59	237.81 \pm 26.576		
Training experience in higher ranked hospitals	≥ 60	228.17 \pm 33.131	-3.508	0.001*
	Yes	232.48 \pm 28.819		
	No	242.04 \pm 25.143		

*Statistically significant.

TABLE 4: Correlation between variables and NMPES.

Variables	Range	Mean \pm SD	r	P	
Perceived stress	0~56	22.09 \pm 7.235	-0.423	0.001*	
	General stress	0~28	10.70 \pm 4.290	-0.423	0.001*
	The ability to cope with stressors	0~28	11.39 \pm 5.824	-0.213	0.001*
Career growth	15~75	59.45 \pm 9.010	0.713	0.001*	
	Career goal	4~20	17.06 \pm 2.587	0.659	0.001*
	Career capability	4~20	18.06 \pm 2.246	0.616	0.001*
	Career opportunity	7~35	24.32 \pm 5.836	0.571	0.001*

*Statistically significant.

TABLE 5: Variables of the multiple linear regression.

Variables	Unstandardized coefficients (b')	Standardized coefficients (Beta)	t	P
Constant	121.045	—	12.966	0.001*
Hospital geographic location	-6.012	-0.100	-2.995	0.003*
Training experience in higher ranked hospitals	4.228	0.076	2.274	0.023*
General stress	-1.351	-0.210	-6.152	0.001*
Career growth	2.944	0.960	12.745	0.001*
Career opportunity	-1.776	-0.375	-5.066	0.001*

*Statistically significant. $R^2 = 0.591$, adjusted $R^2 = 0.586$, $F = 115.309$, and $P < 0.001$.

attach importance to the working environment of NMs, make efforts to support, authorize, and lead change to create a practice environment and ultimately further optimize nursing work.

The results of this study indicate that nurse managers from hospitals in the district capital had significantly higher nursing manager practice environment scores than in the small city. The findings are consistent with research showing that hospital geographic location is one of the influencing factors in the professional practice environment of nurse staffs [40]. One similar study conducted on nursing staff indicated that nurses from hospitals in district capitals rated practice environments significantly more highly than nurses from smaller city hospitals [40]. The findings match those observed in earlier studies using focus group interviews that the geographic location can influence how the nurse manager perceives their practice environment [41]. A possible explanation for this might be that nurse managers who worked in hospitals located in the district capital typically had a larger labor pool and more favorable physical environment than other hospitals, making it easier for them to fill vacancies. This finding is supported by another study that found that hospitals located in rural or suburban areas have fewer qualified registered nurses to fill the position of nurse manager and have decreased staffing, which may influence the nurse manager practice environment [42]. Therefore, the geographic location can influence how the nurse manager perceives the practice environment. It was reported that NMs who worked in private hospitals were more likely to evaluate the practice environments positively than those who worked in public or university hospitals [15, 43]. As for hospital grade, this study's results showed no differences in the NMPES at different levels of hospital. The results also provide evidence that the scores of NMPES of the small city as well as grade II hospital are in a relatively poor state and need to be improved urgently. For nurse managers, the managerial style and work environment of the small city hospitals should be benchmarked against the district capital hospitals. Therefore, it is recommended that hospital managers attach importance to the working environment of nursing managers in small cities by improving the hospital support and guarantee system and providing human resources support and equipment.

In this study, it is interesting to note that participants who had no training experience in higher-ranked hospitals scored highest overall on the nursing manager practice environment, which has not yet been reported before due to a lack of relevant research. The results of this study showed that NMs with training experience in higher ranked hospitals scored statistically significantly lower than those without training experience in terms of resources, workload, and other aspects by further analyzing the subscale score. In contrast, prior study revealed that nurses who have management training experience evaluate their practice environment more positively [15]. Unlike other studies, training experience in higher ranked hospitals referred to in this study does not include academic education but mainly includes training, internships, study visits, or overseas experience for NMs. Hospital rankings are routinely used by medical staffs as a guide in

further training in China. The "higher ranked" hospital usually refers to a comprehensive tertiary hospital, an affiliated teaching hospital of a well-known university, or foreign hospital in developed countries. This is probably a consequence of the equipment and system of the superior hospital being more perfect. It should be noted that the perceptions of nursing workplace were associated with having adequate staffing and resources [44]. We speculate that although the training experiences may offer a sense of fulfilment, the expectation of the gap between two different work environments may also decrease satisfaction for nurse managers in their current nursing unit. It was demonstrated in several studies that the different strategies and policies between hospitals will influence the work environment of nurses [45, 46]. This is supported by research that continuing training, usually at a higher-ranked hospital, provides opportunities for nurse managers to update their knowledge and technology, leading to high-level expectations of the practice environment [26]. Also, it seems that when the practice environment of the hospital where they trained is better, the expectations towards the current situation will be affected. However, more research is needed to analyze the differences between expectations and perceptions of the work environment since we did not measure the perceived and expected work environment by NMs. The unexpected findings have extended our knowledge of the perceptions of practice environment in NMs, which are affected by complex aspects. Thus, areas to improve the practice environment of nurse managers include considering the nurse manager's perspective on the current work environment and increasing their involvement in organizational decision-making. More support is provided to those with training experience, and NMs can transform and apply the management experience, organizational culture, and new technologies learned from higher ranked hospitals to help ultimately improve their work environment and nursing work.

The results also revealed that perceived stress had a significant correlation with NMPES. Both dimensions of perceived stress are negatively correlated with the working environment of nursing managers, and general stress is significantly correlated with NMPES. Better nursing manager practice environments are associated with less perceived stress. Previous studies have confirmed the relationship between a favorable environment for nursing practice and a lower occupational stress level [20, 47]. The work environment of nurse managers has been described as stressful and challenging [48]. It was reported that role overload was the primary predictor of work environment stress in nurse managers [17, 49]. A study in the United States also showed that approximately 62% of nursing managers plan to resign within the next 2–5 years due to occupational stress and burnout [50]. Burnout is a mainly negative consequence of stress, which may decrease satisfaction at work, thereby perpetuating unhealthy work environments of NMs [51]. Therefore, the influence of current psychological states on NMPES deserves attention, and more efforts are needed for nurse managers to keep stress in perspective, contributing to developing healthier work environments.

This study indicated that NMPES had a significant positive correlation with career goal, career capability, and career opportunity. Career growth measures the speed of the employee's career/professional development [33]. Career opportunity relates to the feedback and perception of their career development, promotion speed, and salary increase [25]. Several studies have confirmed the influence of career development is strongly positively correlated with nurses' perceptions of their work environment [52]. A quasiexperimental study in a Dutch hospital by Bloemhof indicated that developing multiple career paths for nurses can improve the nurse work environment [53]. Nurse managers need to conduct suitable career plans for every nurse manager and promote career development in organizational environments that support NM practice [36]. The results of Luse's study showed that managers' managerial strategies, such as career ladders can improve the overall working environment [54]. In a cross-sectional study of 1,010 nurses, career opportunities and job satisfaction were significant variables of the self-assessed work environment in Slovenian hospitals [26]. The majority of these variables also explained the NMPES in our study though the research population is different. This study is the first to report the effect of career growth on NMPES. Creating pathways for personal growth and development for nursing managers and enhancing management skills will improve their work environment.

4.1. Limitations. A few limitations were identified in our study. First, the method of convenience sampling and cross-sectional design used in this study may limit the generalization of the results. Although the research subjects involve different levels of hospitals and six regions, the representativeness of the sample will have a particular impact on the results. Second, regarding the data collection, only self-report online surveys were used, and this may result in reporter bias. The use of multiple data collection methods may enrich the findings. Finally, we only explored the influencing factors from the demographic, psychosocial, and organizational aspects. Other organizational and policy factors are also important variables of the nurse manager practice environment. It is recommended that more comprehensive influencing factors need to be explored to explain the nurse manager practice environment based on a mature theoretical framework. Similar studies in the future can conduct stratified random sampling research and carry out longitudinal studies in order to obtain more rigorous and accurate conclusions.

5. Conclusions

This study was conducted to investigate the status and influencing factors of the nurse manager practice environment in China. Our results indicated that the Chinese nursing manager practice environment has achieved some improvements with a relatively high score.

However, adequate budgeted resources, fair and manageable workload, and NM-physician relationships remain the main issues. Hospital geographic location, training experience in higher ranked hospitals, perceived stress, and career growth were associated factors of the nursing manager's practice environment. It is suggested that more actions need to be taken to improve nursing managers' practice environment by developing a reasonable human resource allocation plan and scientific workflow to increase nursing human resources and material support.

6. Implications for Nursing Management

The results of this study provide insight into nurse managers' perceptions of the practice environment and can be used to form recommendations related to strategies to improve the practice environment. Hospital managers should regularly evaluate the status of the nurse manager practice environment and make improvements in areas of weakness to improve the current status.

Moreover, healthcare leaders can promote a front-line nurse manager practice environment by enhancing the predictors of the practice environment. In terms of hospital characteristics (hospital locations), hospital managers need to learn from larger hospitals to improve human resources and the physical environment to equip the workplace in smaller city hospitals. The results of this study suggest that hospitals in small cities may face particular challenges and require more attention in the practice environment. Although geographical location is an unchangeable factor, hospitals can assess, monitor, and promote practice environment determinants that are sensitive to disparities between different hospital geographic locations. Hospital administrators should emphasize the importance of making constructive changes to the practice environment to attract and maintain nurse managers in these hospital settings. In terms of training experience in a higher-ranked hospital, it is possible to take advantage of the experience to improve the status quo of the current unit. Nursing managers' training experience may expand their horizons and can help to provide specific and personalized recommendations to improve the working environment. Training programs and further education opportunities directed at less experienced nurse managers, especially those working at hospitals in small cities, need to be emphasized. Regulations and policies should focus on addressing nurses' expectations and their satisfying factors to positively impact the practice environment and retention. In terms of psychosocial stress and career development, nursing leaders can take measures to reduce work pressure and provide stress management training programs for NMs, which may positively affect the practice environment. Healthcare leaders need to build a platform conducive to the career growth of NMs, provide career management programs, and consider framing these actions as strategies that potentially contribute to improving job satisfaction and nurse retention.

Data Availability

The cross-sectional study data used to support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

The Nurse-Patient Relationship in Nursing Documentation: The Scope and Quality of Interactions and Prevalent Interventions in Inpatient Mental Health Units

Alonso Pérez-Toribio ¹, Antonio R. Moreno-Poyato ², María Teresa Lluch-Canut ²,
Khadija El-Abidi ², Gema Rubia-Ruiz³, Ana María Rodríguez-López⁴,
Juan J. Pérez-Moreno⁵, Marcelino Vicente Pastor-Bernabeu⁶, Sara Sánchez-Balcells ²,
Ana Ventosa-Ruiz², Montserrat Puig-Llobet ² and Juan F. Roldán-Merino ⁷

¹Mental Health Unit, Primary Care Service Delta de Llobregat/Primary Care Department, Costa de Ponent, Institut Català de la Salut, L'Hospitalet de Llobregat, Barcelona, Spain

²Department of Public Health, Mental Health and Maternal and Child Health Nursing, Faculty of Nursing, Universitat de Barcelona, L'Hospitalet de Llobregat, Barcelona, Spain

³Hospital Infanta Leonor, Madrid, Spain

⁴University Hospital Center de Santiago, Santiago de Compostela, Spain

⁵Psychiatry Service, Galdakao-Usansolo Hospital, Osakidetza-Basque Health Service, Galdakao-Usansolo, Spain

⁶Department of Nursing at the Faculty of Health Sciences of the University of Alicante, Department of Health Alicante-Sant Joan D'Alacant, San Vicente del Raspeig, Spain

⁷Campus Docent Sant Joan de Déu Fundació Privada, University of Barcelona, Barcelona, Spain

Correspondence should be addressed to Antonio R. Moreno-Poyato; amorenopoyato@ub.edu

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Aims. (i) To evaluate the scope and quality of nurse-patient interactions recorded in the clinical notes of inpatient mental health units and (ii) to identify nursing interventions recorded in the context of the nurse-patient relationship in the clinical notes of inpatient mental health units. **Design.** A multimethod approach was used. **Methods.** Employing a quantitative cross-sectional design for the first aim, and a qualitative content analysis design of secondary data for the second aim. In total, 1,714 clinical notes were examined from 44 randomly selected patients who were hospitalized in five mental health units over the years 2022-2023. **Results.** The patient's experience of the interaction was present in 69.9% ($n = 1,198$) of the notes. However, only 12.0% ($n = 205$) of the notes reached a sufficient standard of quality in terms of describing the nurse-patient interactions. Specifically, more than half of the notes did not reflect any type of nursing intervention ($n = 723$; 60.4%). Thirty interventions compatible with the nursing intervention classification were identified, of which more than 70% corresponded to domains in the physiological area. **Conclusion.** This study shows that the quantity and scope of patients' clinical notes in mental health units do not sufficiently reflect the interventions performed by nurses, nor the quality or impact of these interventions in the context of the nurse-patient therapeutic relationship. **Implications for the Profession and/or Patient Care.** Improving the quality of clinical notes by integrating interventions and their impact can increase the quality of nursing care. **Impact.** The use of standardized nursing terminologies would contribute to the understanding of the extent and quality of nurse-patient interactions recorded in clinical notes. Thus, standardized documentation would also help to improve these interactions and their recording, which will facilitate decision-making. **Reporting Method.** Findings were reported using COREQ and STROBE guidelines. **Patient or Public Contributions.** There were no patient or public contributions.

1. Introduction

In the context of person-centered mental health care, proper recording of nursing documentation can be a key strategy for improving the quality and coordination of care and efficiency [1]. To this end, the patient's clinical documentation requires that nursing interventions and the quality of the nurse-patient relationship be properly recorded [2]. However, the literature points to significant deficiencies in documentation, particularly in acute mental health units, where the lack of detailed records affects the continuity and quality of care [3]. There is hardly any empirical evidence available on this issue at the international level, affecting clinical nursing practice in the field of mental health.

When patients are cared for in health services, especially within the hospital setting where they receive continuous care by different professionals, it is important that the care they receive is correctly recorded [4]. In nursing care, care interventions are recorded through nursing clinical notes, which collect a wide variety of information about the patient's care and progress [5]. Nursing clinical notes are defined as the record of nursing care that is planned and provided to patients by nurses or other caregivers with the nurse's supervision and approval [5]. Clinical notes are intended to show what happens in the nursing process and on what basis decisions are made during admission, together with interventions performed, nurse-patient rapport, progress assessments, and assessments by the patients themselves [6]. In addition, nursing clinical notes can be used for other purposes such as quality assurance, legal purposes, health planning, resource allocation, and nursing development and research. To achieve these purposes, nursing clinical notes should be structured [7], contain valid and reliable information, and comply with established standards [8]. Clear and concise nursing clinical notes help health care professionals to detect changes in patients' condition and improve the quality of care [9].

In particular, the recording of nursing interventions in clinical notes is an important part of nurses' work. The aim of these notes is to improve care by ensuring continuity of care [10, 11], enhancing patient safety, reducing miscommunication, and extending access to essential clinical information to all staff caring for a patient [12]. However, clinical notes are not always a description of what is actually done [13]. The quality of nursing clinical notes in some cases is inconsistent and often incomprehensible, poor, inaccurate, and inadequate regarding nursing care [14]. Sometimes, the effects of nursing interventions are neither visible nor verifiable [15]. The records tend to use terse language that is dominated by technical words, capture very limited aspects of nursing practice, and convey very little information to the lay reader [16].

In order to collect more accurate information from nursing notes, the literature recommends the use of standardized nursing terminologies (SNT) [13, 17, 18]. The use of SNTs can lead to improved decision-making, care effectiveness, and care plan evaluations [19], as well as creating links between nursing interventions and patient outcomes [7]. SNTs define nursing care, nursing interventions, and

patient outcomes. SNTs can guide nurses through phases of the nursing process and can enhance the accurate formulation of patient care needs, planning of specific interventions, and communication of care [17]. SNTs have the potential to reduce variability in how nurses define their practice and document its impact on patient care [4]. The American Nurses' Association has recognized the nursing intervention classification (NIC) as the most widely used and best validated SNT classification, with good sustainability compared to other classifications for recording nursing interventions [17, 18]. It describes nursing interventions and consists of seven domains (physiological: basic, complex, behavioral, safety, family, health system, and community), designed to represent care provided in all settings and specialties [18]. In mental health, the most frequently addressed domains are safety and behavioral [19].

In the context of care in mental health units, nurses are by far professionals who interact the most with patients throughout the day [20]. Nursing interventions are placed within the framework of interaction with the patient through the therapeutic relationship [21]. From a person-centered care perspective, active collaboration between nursing staff and patients is necessary to identify personalized recovery goals and develop strategies to achieve those [22]. This collaboration hinges on the principles of attunement and bond, recognized as essential components of the therapeutic relationship [23]. To establish a therapeutic bond, communication marked by empathy, care, and warmth is imperative [24]. In the interplay between bonding and empathy lies the concept of empathic attunement, where practitioners fully engage with the client's internal perspective, acknowledging and adapting to their evolving experience [23]. Therefore, empathy and attunement are fundamental in nursing mental health interventions [25]. Attuning to someone involves sincere efforts to grasp their inner world and convey understanding, a cornerstone of the empathetic therapeutic relationship, recognized as a vital nursing skill for fostering bonds in mental health inpatient care [24, 26].

In this context, it is especially important to use the clinical notes for nurses to record what happens in the nurse-patient relationship [27]. Although interventions delivered in the context of the therapeutic relationship are known to be more effective and have an impact on patients' health outcomes [28], many interventions are not recorded in the course of clinical care [27, 29, 30], rather the records focus more on the problems and symptoms presented by patients [16]. Although previous research has demonstrated that the quality of mental health nursing documentation needed to be improved to ensure continuity and quality of patient care [31], the lack of quality indicators poses a challenge for the search for high quality nursing documentation [17]. Along these lines, a study conducted by Myklebust and Bjørkly, 2019 in Norway, concluded that only 7.6% of the excerpts from the progress notes sufficiently described the interactions in terms of the rapport process in the nurse-patient relationship [27].

Despite the importance of the nurse-patient therapeutic relationship in mental health care, the literature highlights the inconsistency and lack of detail of nursing interventions

reflected in clinical notes. These deficiencies compromise the continuity and quality of care, affecting clinical decision-making and, ultimately, patient health outcomes [1, 3]. It seems necessary to fill the existing gap in empirical evidence on the quality and extent of nursing documentation in mental health by providing concrete data on the quality of records and the nature of interventions.

The present study was designed with a dual purpose: (i) to evaluate the scope and quality of nurse-patient interactions recorded in the clinical notes of inpatient mental health units and (ii) to identify nursing interventions recorded in the context of the nurse-patient relationship in the clinical notes of inpatient mental health units.

2. Materials and Methods

2.1. Study Design. A multimethod approach was used for the present study. A quantitative cross-sectional design was used to assess the extent and quality of the nurse-patient interactions recorded in the clinical notes. Also, a qualitative content analysis design of secondary data in clinical notes was used to identify the nursing interventions recorded in the context of the nurse-patient relationship.

2.2. Sample and Setting. The sample consisted of clinical notes from patients who were hospitalized in mental health units in Spain during the years 2022-2023. Five units were randomly selected for this study which was part of a multicenter project of 12 hospitals of the national health system in Spain called RTS_MHNursing. In this project, all the units were closed units for the care of adults with acute mental health problems. They represented the different geographic areas of the Spanish territory.

The patients included in the study were selected consecutively in each of the units chosen according to the same inclusion criteria as in the larger project. Therefore, adult patients, who consented to participate in the study on a voluntary basis, hospitalized in mental health inpatient units. Participants were excluded if at the time of recruitment they presented a language barrier, mechanical restraint, contraindication by the clinical referent, cognitive impairment, or intellectual disability. No other exclusions were made to maximize the external validity of the study. For the calculation of the sample size of clinical notes required, a study with the same objective, design, and evaluation instrument was used as a reference [25]; thus, the final sample consisted of a total of 1,714 nursing clinical notes from 44 patients who had been hospitalized in 5 mental health units in Spain during the years 2022-2023.

2.3. Data Collection. The researcher responsible for each unit was in charge of collecting the data from the patients' clinical documentation. She was responsible for anonymizing the names of the professionals and names of the patients in the nursing clinical notes of each of the patients included in the study. Records of professionals other than nurses were removed from the data before they were analyzed. The study data were collected and managed using

REDCap electronic data capture tools [32]. In accordance with the research objectives, clinical notes in which the nurse and patient did not have an opportunity to interact were excluded. If a clinical note contained more than one episode of interaction and different patient experiences were reported in relation to these episodes, the note was divided and counted as a separate note.

2.4. Measurement Instrument. To evaluate the extent and quality of nurse-patient interactions recorded, we used the Spanish version of the scale for the evaluation of staff-patient interactions in progress notes [6] and applied it to the selected clinical notes. The SESPI-SP scale assesses the quality of nurse-patient interactions recorded in the notes through patients' experience and the interventions made by the nurses and whether this intervention succeeds in meeting the emotional needs of the patients. This scale consists of four steps detailed as follows:

- (1) Step 1 aims to know if the patient's experience is described in the clinical note, "how is the patient when interacting with the nurse." This is answered dichotomously (Yes/No), and only an affirmative answer enables one to move to the next step.
- (2) Step 2 evaluates whether the patient's experience within the interaction with the nurse was positive or negative. Depending on the degree of satisfaction or dissatisfaction with the patient's response, a response of -II, -I, +I, or +II is given.
- (3) In step 3, one must identify and categorize the nurse's response to the interaction described in the clinical note. Four possible responses are found: (a) the nurse's response is not described in the clinical note; (b) the nurse's response is known, but not the patient's reaction; (c) the nurse's response and the patient's reaction is known, but not the patient's feelings; (d) the nurse's response, the patient's reaction, and the feelings produced by this intervention are recorded, and this feeling with the nurse is called attunement. Only this response enables one to move on to the next step.
- (4) In step 4, this attunement is evaluated positively or negatively depending on whether it has failed or succeeded. Again, the answer is -II, -I, +I, or +II.

3. Data Analysis

To analyze the quantitative data, descriptive statistics were calculated using the IBM SPSSv27 program. The results were presented in the form of frequency and percentages. The qualitative data analysis procedure was based on content analysis [33] and nurse interventions were identified from free-text nursing records in the acute mental health unit setting. First, the first author read the entire text to become familiar with the data. Because the text was not standardized, a data extraction matrix was designed to aid with a proper follow-up. Interventions were then inductively identified through a systematic mapping process. Descriptions of

nurses' actions were then categorized using a deductive approach that reflected the NIC definition of nursing interventions. These descriptions revealed the interventions that nurses performed for or with patients in the context of patient interactions. The first author repeated this analysis process after one month and compared their identifications of NIC interventions by revisiting the original texts and with the rest of the research team.

3.1. Ethical Considerations. This study was approved by the Ethical Committees of five hospitals, and research permission was granted. The data were analyzed anonymously to preserve the anonymity of patients and staff.

4. Results

4.1. Scope and Quality of Interactions in Clinical Notes. A total of 1,714 clinical notes were analyzed. Figure 1 provides an overview of the distribution of clinical notes according to four stages of classification as the quality of records increases. The most remarkable result was that only 12.0% ($n=205$) of notes described the interactions in a sufficient detail to be fully analyzed in terms of recording attunement.

4.2. Description of Patient Experiences in Clinical Notes. Although the description of the patient experience was present in 69.9% ($n=1,198$), almost one-third of the clinical notes did not include any patient-related experience. In most cases, nurses recorded positive and negative patient experiences in the middle range; only 8.3% of notes reflected an extreme positive or negative patient experience.

4.3. Description of Nurse-Patient Interactions in Clinical Notes. Of the notes in which the patient's experience of the interaction had been described, in more than half, no nurse intervention of any kind was recorded ($n=723$; 60.4%). In only 17.1% ($n=205$) of the cases, both nurse interventions and patient responses to that intervention were described. Only 205 of the 1,714 notes (12%) could be evaluated in relation to the quality of the interaction. In 7.8% of the cases, there was a connection in the failed interaction (-II), 0.5% were in the + II or successful connection category, and the majority of interactions were classified as partially failed (11.2%) and partially successful (80.5%).

4.4. Nursing Interventions Identified in Clinical Notes. Of the 1,714 notes analyzed, almost two thirds ($n=1250$; 72.9%) were found to contain an intervention compatible with the NIC taxonomy. From the data analysis, 30 NIC interventions were identified. Nearly 2/3 of the interventions recorded by nurses in the clinical notes were classified as "2304-medication administration: oral" (62.6%), followed by "5360-entertainment therapy" (10.4%). Other prevalent interventions were "4920-active listening" present in 6.1% of the occasions and "5270-emotional support," present in 4.3% of clinical notes (Table 1). It should be noted that more

than 70% of interventions recorded corresponded to domains in the physiological area. The total number of interventions identified and their distribution can be found in Supplementary File 1.

5. Discussion

The present study had a dual purpose; first, to assess the extent and quality of nurse-patient interactions recorded in clinical notes, and second, to identify nursing interventions recorded in the context of the nurse-patient relationship in clinical notes. Regarding the first purpose, the results show that only one out of 10 notes written by nurses sufficiently described interactions to enable a full analysis in terms of the quality of the recording of the nurse-patient interaction process. The most noteworthy result of the second purpose was that most of the nursing interventions recorded in the notes in the context of the nurse-patient relationship respond to interventions of the physiological domain, rather than interventions of a more relational nature, as could be expected in the context of nursing care in acute mental health units.

Nursing clinical notes should reflect how staff understand their patients, how they interact and what nursing care they receive [9]. Deacon and Fairhurst [34] described nursing care in psychiatric hospitalization as a set of activities that are hardly visible and difficult to conceptualize, characterized by individual attention, as well as by routine and continuous work.

Our study, a finding which is compatible with the study by Myklebust et al., showed that 1/3 of total nursing clinical notes studied contained no description of patient experiences [14]. However, the most notable finding was that only 12% ($n=205$) of extracts described nurse-patient interactions to an extent that enabled them to be analyzed in terms of quality. This means that up to 88% of extracts were impossible to evaluate according to attunement, which is a fundamental characteristic of the therapeutic relationship. Therefore, in most of the notes, the quality of the bond, an essential characteristic in the nurse-patient therapeutic relationship, could not be assessed [24]. These results are in line with previous research that has found that traditionally, nurses underestimate the value of their documentation and the extent to which their diagnostic accuracy leads to better patient outcomes [4].

In most cases, in clinical notes, nurses recorded descriptions of patients' experiences in terms of positive and negative attunement distributed in a medium range; thus, only 8.3% of notes reflected an extreme positive or negative experience of the patients. This result is in complete agreement with the findings by Myklebust and Bjørkly [25].

In over half of clinical notes, no intervention of any kind was recorded by the nurse towards the patient once there had been an interaction. Myklebust et al. [14] concluded that while writing clinical notes, nurses position themselves as observers, and although the relationship between staff and patients is essential, nurses do not consider the relevance of documenting these interactions. This may be one reason why

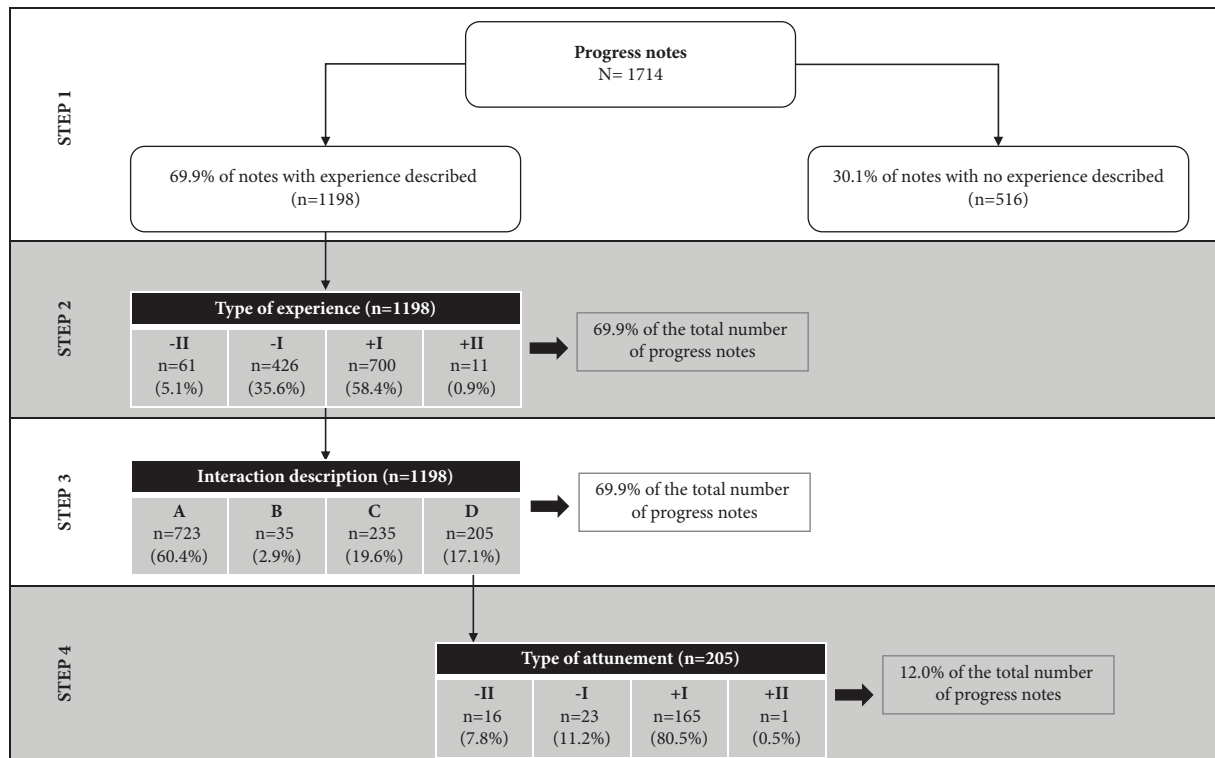


FIGURE 1: Distribution of the scope and quality of interactions in clinical notes.

TABLE 1: Distribution of identified nursing interventions' classification and related domains.

Nursing interventions' classification	n (%)	Domains
2304-medication administration: oral	783 (62.6)	Physiological: complex
5360-recreation therapy	130 (10.4)	Behavioral
4920-active listening	76 (6.1)	Behavioral
5270-emotional support	54 (4.3)	Behavioral
2313-medication administration: intramuscular (IM)	30 (2.4)	Physiological: complex
4380-limit setting	25 (2)	Behavioral
6580-physical restraint	18 (1.4)	Physiological: basic
1800-self-care assistance	16 (1.3)	Physiological: basic
3660-wound care	16 (1.3)	Physiological: complex
4360-behavior modification	16 (1.3)	Behavioral
5820-anxiety reduction	14 (1.1)	Behavioral
5020-conflict mediation	12 (1)	Behavioral
4640-anger control assistance	10 (0.8)	Behavioral
Others	50 (4)	

n = 1250.

the clinical notes included very little information about what the nurses had done to help the patient, other than observing and coordinating care.

Only one in five of clinical notes that did record the patient-related experience described both the nurses' interventions and the patients' responses. As in other studies, our findings indicate that nursing documentation does not accurately describe actual nursing care [27, 29, 30].

Inpatients positively value the ability of health care personnel to understand and comprehend their experiences and feelings [24]. This may explain why clinical notes

recording the interventions and the nurse-patient attunement in the interactions between them are mostly partially satisfactory (80.5%).

The second objective of our study was to identify and describe nursing interventions on nurse-patient interactions in clinical notes of acute mental health units using the NIC domains as a framework for assessing the outcomes of nursing clinical notes. In our study, almost two thirds of the nursing notes studied showed some intervention compatible with the NIC taxonomy. Frauenfelder et al. demonstrated that the NIC covers the essential nursing care interventions,

since 89.4% of all the intervention descriptions in their study fully coincided with the NIC [19]. However, our study is close to the one conducted by De Groot et al. [3] which concluded that only half of the respondents used SNT in their clinical notes. Ameel et al. [15] concluded that interventions such as presence or listening may not be recorded, as they are not perceived as interventions because they are an obvious part of nursing care.

In our study, the “active listening” intervention hardly appears; this finding may be because the nurses consider this intervention to be routine and for this reason, they do not consider it necessary in recording this intervention.

Another study conducted by Frauenfelder et al. [19] showed that the NIC intervention “surveillance” was essential as they concluded that the need for surveillance is one of the reasons for admitting patients to acute inpatient facilities for nurses to assess patients through interactions and observation of symptoms. However, in our study this intervention is not collected, only 30 NIC interventions were identified, a result far removed from the one performed by Ameel et al. [15]; who identified 71 different nursing interventions, 64 of which are described in the NIC. This lack of collection and recording of the interventions performed by the nurses in our study can be understood according to the findings by Ameel et al. [15] and Fore et al. [29] who explain that this occurs when nurses have integrated interventions as part of their work and do not record them.

In our study most of the interventions recorded corresponded to domains in the physiological area, represented by the administration of both oral and intramuscular medication and wound care. If we compare the results of our study with others conducted in a similar setting, hospital care. Ameel et al. [15] and Frauenfelder et al. [19] most prevalent interventions were in the safety and behavioral domains. The safety domain is not represented among the most prevalent NICs in our study, even though vigilance is one of the tasks most frequently performed in acute mental health units. This result can be explained by the delegation of competencies in the interdisciplinary team. However, the behavioral domain appears to be represented in several interventions such as (limit setting 4380; recreation therapy 5360; active listening 4920; emotional support 5270; behavior modification 4360; anxiety reduction 5820; conflict mediation 5020; anger control assistance 4640). Another study conducted by Thomé et al. [35] analyzed the documentation of patients in an outpatient center in Brazil, and their most prevalent interventions were assistance in self-care, socialization, and promotion of exercise. In this case, these interventions have not been collected in our study of clinical notes. This difference may be explained by the different health care context.

Nurses have a deep-rooted biomedical model of care [28], which influences the therapeutic relationship [14]. Therefore, these findings could in part explain the incomplete or inadequate nursing records in patients’ clinical notes, or records based more on the biomedical model than on nurse-patient interactions [30].

6. Strengths and Limitations

The nursing clinical notes from the selected facilities did not use SNT, which means that results are based on the analysis of free-text notes, which included very few direct descriptions of nursing interventions. With free-text note analysis, there is a possibility of using too much interpretation during the process of analyzing the notes.

Due to the large number of randomized extracts and the fact that around 100 people wrote in the selection period, the risk of author bias was low in the dataset.

One of the strengths of the present study was the considerable number of randomized evolution notes collected from five different acute mental health units. The five mental health units chosen for this research represented a wide range of patient illness stages, diagnoses, and degrees of coercive or voluntary treatment.

7. Implications for Nursing Management

To our knowledge, there are few international quantitative studies measuring the quantity and quality of staff-patient interactions in nursing documentation in mental health settings. Consequently, the present study appears to represent an important step in the effort to explore the extent and quality of documented staff-patient interactions and the quality of documented nurse-patient interactions.

Improving the quality of clinical notes by integrating interventions and their impact, also considering the degree of nurse-patient harmony, can contribute to an increase in the quality of nursing care. This could increase patient satisfaction with the admission and their experience. It would be interesting to try to raise awareness of the importance of a systematized record of nursing clinical courses that include SNT and patient experiences related to the interventions, which would reinforce the training curriculum of mental health nurses.

The SESPI-Sp can provide data to qualitatively assess nursing documentation in relation to nursing interventions performed in the context of interactions with patients in mental health units. In this manner, it contributes to the improvement of the quality of mental health nursing care.

The SNT could play an important role in the development of nursing documentation, thereby becoming a better source for the evaluation and development of staff-patient interactions in clinical practice.

A more standardized use would contribute to the understanding of the extent and quality of nurse-patient interactions recorded in clinical notes. In this manner, standardized documentation would also help to improve these interactions and their recording, which will facilitate decision-making and help to provide solutions to problems that may arise during patient care.

Reading the clinical notes log explored in this study suggests that nurses record very little of the time they spend interacting with patients in the context of the therapeutic relationship. These insights highlight the need for

interventions to establish and develop the nurse-patient relationship. Consequently, it could be of interest to managers when planning the structure and staffing needs in inpatient mental health care.

8. Conclusions

The results of this study provide insight into the quality and quantity of nursing clinical notes related to patient experiences and nurse-patient interactions. Of the total number of clinical notes studied, only 12% described the relationship and rapport between nurse and patient in their interactions with sufficient quality. This means that the patients' feelings and experiences revealed in the context of the nurse-patient relationship are not adequately recorded in the documentation.

The clinical notes studied identified the recorded nursing interventions, 30 of which are described in the NIC. However, interventions of a relational nature, which are considered highly relevant and important in mental health nursing care, were almost nonexistent in the clinical documentation.

Consequently, nursing clinical notes did not fully and adequately record the interventions that nurses perform, as well as the impact of the interventions.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

This study was approved by the Ethical Committees of five hospitals, and research permission was granted.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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Supplementary Materials

Supplementary File 1: Total number of interventions identified in the clinical notes studied and their distribution by frequency and percentage. (*Supplementary Materials*)

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Research Article

Nurses' Experiences from Patient Safety Incidents of Hospitalized Children: A Qualitative Study

Haeyoung Lee ¹ and Yujeong Kim ²

¹Red Cross College of Nursing, Chung-Ang University, Seoul, Republic of Korea

²College of Nursing, Research Institute of Nursing Innovation, Kyungpook National University, Daegu, Republic of Korea

Correspondence should be addressed to Yujeong Kim; yujeongkim@knu.ac.kr

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This qualitative study aimed at exploring nurses' experiences concerning patient safety incidents among hospitalized children in South Korea. From August 4 to 12, 2023, data were collected through in-depth individual interviews involving 14 clinical nurses. Employing thematic analysis, we identified 8 themes, which coalesced into three theme clusters: "challenges in pediatric patient safety nursing due to patient and caregiver characteristics," "emotional changes in nurses following patient safety incidents," and "sincere desire to prevent patient safety incidents in pediatric patients." The findings underscored that nurses experience significant burdens related to patient safety, emphasizing the necessity for robust support from caregivers, healthcare institutions, and national policies. Consequently, it is imperative to develop and implement programs and policies to foster a secure care environment for pediatric patients. Nurse managers and organizations must proactively design healthcare systems and related policies that prioritize safely protecting pediatric patients and nurses alike from patient safety incidents, considering the characteristics of pediatric patients and the experiences of the nurses caring for them.

1. Introduction

Ensuring patient safety in public healthcare remains a critical challenge globally, given its significant impact on mortality and disability rates [1]. In low- and middle-income countries, hospitals have witnessed approximately 134 million adverse events stemming from unsafe care [2]. Shockingly, these events contributed to 60% of all reported mortalities due to inadequate and substandard care [3]. Similarly, in high-income countries, on average, one in ten patients is reported to experience adverse events during hospitalization [4]. Patient safety encompasses a comprehensive approach, integrating cultures, processes, procedures, behaviors, and environments to mitigate risks and errors that could harm patients. It is currently a strategic priority for the healthcare field and is emphasized as a core aspect of national efforts towards universal health coverage [1].

Hospitalized children are especially vulnerable to severe, or even fatal, harm in the event of patient safety incidents. This vulnerability stems from their immature physical and physiological functions, as well as their limited ability to assess and manage risky situations [5]. Moreover, children are at a stage of rapid growth and development, and patient safety incidents at this stage can have severe, long-term effects on not only physical development but also psychological, cognitive, and social development [6]. Since nurses are the closest professional group providing direct care to hospitalized children, they are in an important position to improve patient safety [7]. While caring for patients, nurses experience many different patient safety incidents, including medication errors, falls, and bedsores [8]. Despite diligently performing their duties, these incidents can be unpredictable and persistently occur. It is imperative to delve deeper into nurses' firsthand experiences with patient safety incidents in clinical settings through comprehensive research to foster

safer hospital environments and systems tailored to pediatric patients.

In our examination of both domestic and international literature concerning patient safety incidents involving hospitalized children, we came across studies that focused on family perceptions or experiences related to these incidents [9–11]. Additionally, research has delved into the perspectives of physicians, nurses, and patient care technicians concerning collaborations with parents to ensure patient safety [12]. Moreover, investigations have explored the relationship between medication errors and job satisfaction among nurses in pediatric wards [13]. However, there is a notable gap in research specifically addressing the varied experiences of pediatric nurses who directly care for pediatric patients, as well as pinpointing areas of concern and improvement in pediatric patient safety.

In the case of South Korea, the total fertility rate in 2022 is 0.778, which is half of the OECD average of 1.59, the lowest among OECD countries [14]. In addition to the rapid decline in the number of newborns, the cost of pediatric treatment is very low. The lack of doctors and long waiting times cause a lot of rudeness, verbal abuse, and legal disputes from patients' parents against medical staff, making it the worst treatment environment for doctors and nurses [15]. As a result, doctors avoid treating children, and the pediatric care system in South Korea is collapsing [16]. Therefore, it is necessary to analyze the experiences of pediatric patient safety accidents that occurred in such a heavy workload and stressful working environment and establish policies to create an optimal working environment for pediatric nurses to improve pediatric patient safety.

In the present study, we applied qualitative research methods to delve deeply into the experiences of nurses regarding patient safety incidents involving pediatric patients. Our objective was to identify challenges, obstacles, and potential strategies to enhance the management of patient safety incidents as perceived by the nurses. We anticipate that our findings will help contribute to the formation of hospital environments adept at preventing and addressing patient safety incidents in pediatric care. Furthermore, we aspire to influence the development of healthcare policies that prioritize the safety and well-being of both patients and nurses.

2. Materials and Methods

2.1. Study Design. This was a qualitative study collecting and analyzing data from in-depth interviews, intending to comprehensively understand and explore nurses' experiences of patient safety incidents in hospitalized children.

2.2. Participant Selection and Investigator Preparation. The inclusion criteria for participants in this study were specific: We sought nurses currently employed at healthcare institutions with at least 6 months of nursing experience. Additionally, these nurses must have encountered patient safety incidents involving pediatric patients they cared for within the past three years. Importantly, the incidents should

have involved patients aged 15 years or younger at the time of hospitalization. The sole exclusion criterion was a refusal to have the interview recorded.

The researchers posted information about the study objectives and methods to an online community for nurses in Korea. People who wanted to participate could use a link or a QR barcode to access an online site for study participation. Visitors to the website could review the comprehensive study details and provide their contact details if they chose to participate voluntarily. Subsequently, the investigators reached out to these individuals to elucidate the study's purpose and arrange interview sessions. Interviews were conducted until reaching theoretical saturation, meaning no new significant insights emerged from participants' narratives. Ultimately, the study involved 14 participants.

Given that the main instruments for qualitative research are the researchers themselves, to ensure reliability and train their ability to analyze results, the researchers gave talks and lectures on qualitative research in graduate courses and at related academic conferences. The researchers also have direct experiences of conducting qualitative research several times. During our tenure at the hospital, the researchers worked at a quality and patient safety center that performs activities to analyze and improve patient safety incidents. During this time, they analyzed the causes of patient safety incidents, interviewed healthcare workers, patients, and caregivers to make improvements, and accumulated practical experience understanding the interview content. The corresponding author also has extensive experience in pediatric nursing for 5 years working as a nurse in a pediatric ICU. We made efforts to minimize the effects of researcher bias or opinions on the interviews and results analysis and to maximally reflect the experiences and opinions of the participants.

2.3. Ethical Consideration. Before conducting the study, we received approval from the institutional review board at Kyungpook National University (no. 2023-0365), where the participants were affiliated. Subsequently, we initiated the data collection process. Before conducting the interviews, the researchers thoroughly explained the study objectives, procedures, and methods to the participants. Importantly, participants were assured of their right to withdraw from the study at any time. The researchers explained that data collected from the participants would not be used for anything other than research purposes. Additionally, we clarified that all interviews would be recorded with strict confidentiality measures in place to safeguard participants' privacy. Furthermore, we assured participants that their involvement would incur no adverse consequences. Individuals willing to participate then submitted their online consent forms online before proceeding with the interview. The interview data were processed directly by the researchers to protect the participants' privacy; the data were coded and then stored in the laboratory. The participants were sent a mobile coupon as a token of appreciation.

2.4. Data Collection. The individual in-depth interviews with participants were conducted between August 4 and August 12, 2023. Given the prevailing COVID-19 circumstances, we opted for remote interviews facilitated through Zoom. To prevent missing or erroneous data, only audio recordings were made with explicit consent, ensuring no video recordings were captured to prevent the disclosure of personally identifiable details. Each participant was interviewed once, with each interview taking between 60 and 100 minutes. The questions in the interview guide were composed by two researchers who had been responsible for analyzing patient safety incidents at a healthcare institution and who had ample experience in interviewing healthcare workers. The questions were semistructured, and the interview guide was provided in Supplementary 1. The main question for the in-depth interviews was, "What experiences have you had relating to patient safety incidents affecting hospitalized children you were caring for?" Additional questions included the following: "If the cause of the incident was due to healthcare workers, caregivers, or the hospital, what was the cause?" "What do you find most difficult about patient safety nursing for pediatric patients?" and "What is needed to prevent and ameliorate patient safety incidents for pediatric patients?" Questions were asked sequentially, depending on the flow of the conversation, making efforts to extend the conversation without interrupting the participant. The participants' speech was transcribed word-for-word, and nonverbal expressions, such as silence and sighs, were also recorded during the interview.

2.5. Data Analysis. The recorded data in the analysis, including the transcriptions of the interview recordings and the researchers' notes taken during the interview, amounted to 176 pages of A4 paper. Postinterview, the recorded content was promptly transcribed within a day. Two researchers performed data analysis using a thematic analysis approach after all the interviews had been completed. The researchers reviewed and supplemented the analysis through discussions to produce the final analysis. The thematic analysis used in this study was performed in 6 stages, following the method of Braun and Clarke [17]. (1) The transcripts of the recordings were read repeatedly to achieve familiarity with the data; (2) the meaningful content in the transcripts was coded, and content corresponding to each code was combined; (3) potential themes were generated by grouping codes, and all data related to each theme were organized; (4) the relationships between the themes and coded data were reviewed, and similar themes were grouped repeatedly to define theme clusters; (5) each theme was given a distinctive name; and (6) examples were identified that could explain each theme, and the report was written.

2.6. Validity and Rigor. We aimed to ensure the rigor of this qualitative study based on the factors proposed by Sandelowski [18]: credibility, auditability, fittingness, and confirmability.

For credibility, at the participant selection stage, we recruited participants who had previous experiences of patient safety incidents affecting hospitalized children, and those who could describe their experiences. Through open questions and a comfortable atmosphere, we created an interview environment that would allow participants to express their opinions freely. Moreover, by transcribing interviews promptly within a day, we aimed to minimize omission and distortion of the interview content. During data analysis, we aimed to derive credible results through thorough discussions between the researchers.

Addressing auditability, we aimed to describe the study objectives and methods in detail and aid readers' understanding.

To satisfy the criteria for fittingness, we described the participants' general characteristics. In addition, we collected data until the saturation point, when participant's statements were repeating, and we could no longer derive any new content.

Finally, to ensure confirmability, we made efforts to minimize the researchers' bias, maintaining a neutral stance throughout the research process. This approach safeguarded against any undue influence of researchers' feelings or experiences on participants' responses.

3. Results

The general characteristics of the participants are presented in Table 1. The participants were all female, with a mean age of 31.6 ± 5.5 years. Specifically, seven participants (50.0%) fell within the 20- to 29-age bracket, while five participants (35.7%) were aged between 30 and 39 years. Regarding the type of healthcare institutions, 12 participants (85.7%) were affiliated with tertiary hospitals. In terms of departmental roles, 10 participants (71.4%) served in general wards, three (21.4%) worked in intensive care units, and one (7.2%) was stationed in the emergency room. The mean nursing experience was 8.0 ± 5.7 years, and three participants (21.4%) were parents themselves.

During the analysis of the interview content, 199 codes were generated in stages 1 and 2, and mutually related codes were classified to form 8 themes in stage 3. In stages 4 and 5, the themes were structured into three theme clusters with more comprehensive meanings: "challenges in pediatric patient safety nursing due to patient and caregiver characteristics," "emotional changes in nurses following patient safety incidents," and "sincere desire to prevent patient safety incidents in pediatric patients" (Table 2).

3.1. Challenges in Pediatric Patient Safety Nursing due to Patient and Caregiver Characteristics

3.1.1. Risk due to Difficulties Communicating with Pediatric Patients. The participants had experienced difficulties precisely identifying symptoms in pediatric patients because children have difficulty expressing themselves clearly or are afraid of healthcare workers, while infants are incapable of

TABLE 1: General characteristics of the participants.

ID	Sex	Age (yr)	Hospital	Department	Nursing career (yr)	Having children
1	F	28	General hospital	Ward	2.4	No
2	F	24	Tertiary hospital	Emergency room	1.5	No
3	F	40	Tertiary hospital	Ward	18.0	No
4	F	28	Tertiary hospital	Ward	2.5	No
5	F	34	Tertiary hospital	Ward	10.2	No
6	F	38	General hospital	Ward	16.5	No
7	F	30	Tertiary hospital	Ward	5.8	No
8	F	26	Tertiary hospital	Ward	4.3	No
9	F	35	Tertiary hospital	Intensive care unit	11.3	Yes
10	F	41	Tertiary hospital	Ward	15.0	Yes
11	F	29	Tertiary hospital	Ward	8.0	No
12	F	26	Tertiary hospital	Intensive care unit	0.8	No
13	F	34	Tertiary hospital	Ward	10.3	Yes
14	F	29	Tertiary hospital	Intensive care unit	5.0	No

communication. When a pediatric patient cries or complains of discomfort, it is difficult for nurses to tell whether it is due to pain, or if the child is simply whining. This can delay diagnosis, examinations, or treatment, amplifying the perceived urgency and potential risk of the situation. Given the inherent nature of childhood marked by curiosity, pediatric patients frequently engage in playful and sometimes reckless behaviors. This can include attempting to interact with medical equipment, removing dressings from injection sites, or even jumping on beds or climbing on IV poles despite being cautioned about the potential risks of falls. Such behaviors escalate the likelihood of patient safety incidents.

“Most children can not easily express themselves verbally, so you do not know if they are crying because it hurts. Often, even if I want to be proactive and help the patient quickly, I have to take a moment to think again. Those moments are difficult. It would be much better if they could tell us where they were hurting, but as the nurse, you have to test one thing at a time, and that takes a long time” (Participant 3).

“Children do not stay still just because you tell them to. They do not take the hospital seriously, and they run around all over the place playing however they like, pressing infusion pump buttons and turning IV regulators” (Participant 6).

3.1.2. Risk due to Excessive Workload. The participants highlighted that it was difficult to find the vein when placing an IV catheter in pediatric patients. Furthermore, the procedures took a long time due to a lack of cooperation, especially if patients were crying or moving, and they often required help from other people. Newly graduated nurses, lacking experience, frequently encounter difficulties in delivering treatments to pediatric patients, leading to errors that require intervention from more seasoned nurses. Additionally, tasks like changing hospital gowns or bedding for pediatric patients demand more time compared to adult care, intensifying the workload. Moreover, because children require smaller doses of medication, the dose needs to be calculated precisely, and when heavy workloads make it

difficult to practice safe nursing, there is a high risk of errors, which can lead to dangerous situations for the patient. This results in a greater sense of burden and danger for nurses.

“When children try to grab the IV, one person each needs to hold the arms and legs, so everyone has to stop what they are doing and help hold the IV. It is difficult to find the vein in children, and they cry and move around, and so you have to wrestle with them for twenty minutes. For all that time, nobody working on the ward can get anything else done” (Participant 6).

“When giving medication to adults, the prescription is 1 vial, so you can just give them the whole vial. For children, you have to calculate the dose accurately, and of course, you have to hand up the infusion pump, which takes more time and is something you have to worry about. In children, the consequences of me making even a small mistake can be very severe, and so it is a major burden for nurses. We should check one more time and be meticulous, but it is easy to miss something when we’re so busy” (Participant 13).

3.1.3. Stress due to Caregivers’ Sensitivity. Participants indicated that caregivers, despite recognizing the demanding nature of nursing duties and the critical needs of other patients, often prioritized their own child’s care. Consequently, some caregivers expressed anger, frustration, and impatience when they felt their child was not attended to promptly. In the ICU, caregivers would constantly call with inquiries even beyond designated visiting hours. Such interactions, coupled with caregivers occasionally eavesdropping on conversations, contributed to heightened stress levels among nurses. Due to these challenges, many nurses avoid working in pediatric wards, and new pediatric nurses also complain of high levels of stress.

“The sensitivity of caregivers is probably a difficulty that only pediatric nurses have to experience. Lately, people aren’t having many children, and when it is the parent’s only child, it is really precious. Even though I’ve told the caregiver that I have an urgent situation or I have to give

TABLE 2: Nurses' experience related to patient safety incidents of hospitalized children.

Theme clusters	Themes
Challenges in pediatric patient safety nursing due to patient and caregiver characteristics	Risk due to difficulties communicating with pediatric patients Risk due to excessive workload Stress due to caregivers' sensitivity
Emotional changes in nurses following patient safety incidents	Getting swept up in negative emotions Trying even harder to prevent accidents
Sincere desire to prevent patient safety incidents in pediatric patients	Improving safety awareness of caregivers Improving pediatric care-related infrastructure and policy support Improving support for patient safety activities and culture within the hospital

CPR to another patient, they shout at me, asking me to change the sheets. They can see for themselves that it is an emergency, but a lot of them get too sensitive about trivial things. The caregivers are far more sensitive than those in an adult ward” (Participant 7).

“A lot of nurses refuse to work in the pediatric department. That’s because there are so many complaints from caregivers. Everyone avoids working in the pediatric wards because the caregivers complain about everything, even down to the nurses” tone of speech. Experienced nurses may be able to somewhat control rude or sensitive caregivers, but new nurses are reduced to tears and say that controlling the caregivers is the hardest part (Participant 3).

3.2. Emotional Changes in Nurses following Patient Safety Incidents

3.2.1. Getting Swept Up in Negative Emotions. Following patient safety incidents, such as falls or medication errors, participants reported feeling surprised by the incident and also sorry that they could not care properly for the patient as their nurse. They were also worried or fearful of the patient’s condition worsening due to the safety incident and felt guilty about their error. Moreover, strained relationships with caregivers added to their sense of burden, making communication challenging. On the other hand, even though it was a patient safety incident caused by the mistake of a child or parents, nurses wrote the incident report, and some participants felt wronged by the fact that the nurse was held responsible for the cause of the accident blaming it on the nurse’s negligence and lack of explanation.

“I felt a sense of shame, thinking thoughts like, “I made a mistake to the child,” “What if something happens to the baby because of me?,” “Why did I make another mistake?” I felt like I had made an enormous mistake, and I felt like I was tiny” (Participant 12).

Writing a fall report is very stressful and difficult for nurses. It feels like it is placing too much of the responsibility on the nurse. I feel harshly treated because it makes it so that the fall is the fault of the primary nurse” (Participant 1).

3.2.2. Trying Even Harder to Prevent Accidents. Following a patient safety incident, the participants worked hard to follow patient safety principles, such as removing the IV site fixation dressing and checking for redness and swelling even if there is no complaint of pain, and repeated education on the risk of falls and the importance of prevention, even though they were busy. The participants performed their rounds more intensively to prevent new patient safety incidents and recurrence. They also continually provided education, explaining safety rules and their importance to improve caregivers’ perceptions of patient safety.

“Since it is all we can do to explain about safety, we try to keep reminding the caregivers. And we really did a lot of rounds. Not only the on-duty nurse, but also the nurse managers, and the nurse practitioners visited the patient multiple times” (Participant 8).

“Since the patient safety incident, I made efforts to follow the basic rules more precisely. I thought I should have checked the IV site, even if the child was sleeping. Since then, I explained a little more to the caregiver that, because it is an important and somewhat dangerous drug, they need to check the injection site, even if the child wakes up, and I also check more often” (Participant 13).

3.3. Sincere Desire to Prevent Patient Safety Incidents in Pediatric Patients

3.3.1. Improving Safety Awareness of Caregivers. Participants observed that caregivers frequently overlooked patient safety concerns. They expressed concerns about caregivers leaving infants unattended on beds while attending to other matters outside the ward. Additionally, caregivers often seemed distracted and engrossed in their phones or television screens, potentially compromising the child’s safety within the ward. Participants emphasized the need for caregivers to prevent children from engaging in hazardous behaviors and underscored the importance of imparting discipline. Recognizing that caregivers are ideally positioned to identify shifts in a patient’s condition, participants highlighted their pivotal role in effectively communicating the child’s status to healthcare professionals.

“Hospitals are unfamiliar environments for children, with a high risk of falls. Sometimes caregivers will lie down and play with their phones or watch TV or go in and out of the ward to take a phone call. It’s actually really dangerous to just leave a child alone. I think they feel like nothing could happen in a hospital” (Participant 6).

“Actually, the caregivers know better than me how the child is different from usual. It would be good if caregivers would tell the healthcare workers immediately if there was anything that seemed strange or there seemed to be a problem, and if they would ask us what had happened. Since there are many things we miss, these questions would provide us with an opportunity to check the patient again. It’s surprisingly uncommon for caregivers to ask questions like, “Why is this the case?” when visiting. Usually, they just say something like, “Please take good care of him/her” (Participant 14).

3.3.2. Improving Pediatric Care-Related Infrastructure and Policy Support. Participants highlighted that the diminishing number of pediatric residents in Korea over the last several years has resulted in an increased workload for nurses, as they assume tasks typically handled by pediatricians in tertiary hospitals. This shift has intensified work

pressures. Furthermore, the participants felt that patients' health was threatened by the gap in pediatric treatment due to the closure of pediatric hospitals and clinics. In addition, participants emphasized that caring for children entails more nursing responsibilities compared to adult patients. Patient safety incidents were attributed to the existing shortage of nursing staff. Specifically, new nurses have to care for the same number of patients despite lacking the required knowledge and skills, which further increases the risk of patient safety incidents. Participants expressed concern about the demanding workload of all nurses, such that newer ones found it challenging to seek or obtain assistance when needed. The participants reported the need for national policies to improve support for pediatric healthcare workers, including doctors and nurses, and to increase the fees for pediatric healthcare. In addition, given the characteristics of pediatric patients, they reported the need for support to further develop medical devices and materials to prevent patient safety incidents, urging their integration into healthcare institutions.

"We haven't had any new pediatric residents for 2 years, so the 3rd and 4th-year residents are continuing to be on duty on alternating days. As a result, the excessive workloads of pediatric doctors are getting worse. This means that doctors' work is being passed on to nurses. The lack of doctors is ultimately leading to excessive work for nurses. Blood collection was usually done by doctors, but now it is being done by nurses. Our time spent directly caring for patients has decreased, and I'm worried that this might lead to more patient safety incidents in pediatric wards in the future" (Participant 7).

"For medical materials as well, you can get by with just one or two sizes for adults, but you need to prepare all different sizes for children. It would be nice if we had all children's beds as well, because of falls, but nothing changes when we ask, because they are too expensive. Because children might try to press buttons on medical devices for fun, we need to bring in more secure devices, such as devices with locks" (Participant 3).

3.3.3. Improving Support for Patient Safety Activities and Culture within the Hospital. Participants proposed that creating educational videos within hospitals to instruct pediatric patients and their caregivers about falls and general patient safety could prove highly effective in both education and incident prevention. Additionally, they believed that distributing patient safety-related pamphlets or campaigns could enhance caregivers' awareness of patient safety. In addition, participants wanted parents to understand the poor and busy working environments of nurses, urging for mutual respect. They also hoped that a positive patient safety culture would be established that would move away from the negative culture that focuses on criticizing and punishing healthcare workers who cause patient safety accidents. Instead, it would focus on improving the work environment to prevent future patient safety incidents. The participants also reported the need to strengthen activities and support for

patient safety at the hospital level, such as asking the hospital to make a pediatric IV team to accurately and safely secure IVs in pediatric patients and to prevent vasculitis, which is a common complication among children.

"If we made short educational videos about patient safety and had the patient and caregiver watch these before admission, I think it would help with understanding when we explain. I think it would help if there were fall videos suited for children. Children can concentrate and watch videos on YouTube or other platforms. It would be easier for nurses to explain and also improve patients' awareness" (Participant 5).

"They blame everything on the nurses. Even if the doctor gave the wrong orders, they say it is the nurse's fault because they should have caught it. Nurses are busy and having a hard time because we have to see so many patients, but they do not think of that. When you are this busy, mistakes are inevitable, but they do not think about our circumstances and they only talk about the mistake. I wish [caregivers] would understand our situation and trust and listen to the healthcare workers" (Participant 14).

4. Discussion

In this study, we comprehensively explored nurses' experiences of patient safety incidents affecting hospitalized children. After analyzing the content of interviews with the nurses, we derived and discussed 3 theme clusters: "challenges in pediatric patient safety nursing due to patient and caregiver characteristics," "emotional changes in nurses following patient safety incidents," and "sincere desire to prevent patient safety incidents in pediatric patients."

In the first theme cluster, participants expressed the sense of burden felt by pediatric nurses who always have to be extremely careful to try to prevent patient safety incidents while caring for pediatric patients. In addition, when caring for infant patients, clear communication is impossible, and cooperation during treatment is difficult, often resulting in prolonged treatment durations and heightened nurse workload. Furthermore, there is a considerable burden associated with the need to precisely calculate medication doses relative to body weight for children; however, sensitive reactions from caregivers who often prioritize their child's needs exclusively further exacerbate the stress of nurses. This aligns with findings from a prior study on pediatric nurses [19], where family caregivers sometimes exhibited behaviors, such as prioritizing their own child's needs to the exclusion of respecting nurses or even resorting to derogatory language. Such interactions elicited negative emotions from nurses and introduced ethical dilemmas when these sentiments impacted patient care. Given that children are inherently more vulnerable and susceptible to anxiety and fear than adults, it underscores the imperative for pediatric nurses to exhibit heightened patience, expertise, and an unwavering commitment to patient safety [20]. In China, the combination of a demanding workload and challenging

interactions with discerning parents has been pinpointed as contributing factors to heightened work stress, burnout, and turnover rates among pediatric nurses, with a notable 40% of pediatric nurses expressing job dissatisfaction [21]. Family-centered care is a core aspect of pediatric nursing care, with nurses respecting the dignity of the child and their family and providing care based on partnerships [22]. However, for patients to receive the highest level of safe nursing, it is essential for the patient's parents also to try to understand and respect the difficulties of nurses and make efforts to form positive partnerships with the nurses. Moreover, there is a need to provide opportunities and compensation to improve pediatric nurses' workload, reduce work stress, and encourage continual career development [21].

In the second theme cluster, nurses reported being consumed by negative emotions, including not only surprise but also sorrow towards the patient, concern and fear about the patient's condition, and guilt about their own mistakes. However, they also worked even harder to follow patient safety principles after an incident, went on rounds more often to prevent recurrence, and continued education to explain the importance of patient safety to caregivers.

Since a hazardous accident can lead to severe injury or even death, the primary victims of such accidents are the patient and their family. Nevertheless, healthcare workers affected can also experience psychological shock and emotional distress and thus are recognized as second victims of these accidents [23]. The second victims of patient safety incidents show emotional responses, including guilt, anger, despair, psychological stress, and fear, and have even been reported to show physical symptoms, such as fatigue and insomnia, as well as divergent behaviors [24]. Some nurses have even experienced difficulties sleeping or eating [25]. These responses by second victims can lead to harmful outcomes in the personal and professional lives of healthcare workers, including posttraumatic stress disorder, turnover, and suicide [26]. Nurses experience more negative emotions compared to physicians [27], and this can lead to a worsening cycle by inducing burnout and depression, making nurses further unable to provide appropriate care [28]. Specifically, when nurses continue working without properly addressing the emotional stress stemming from a patient safety incident, it can escalate the risk of subsequent accidents. Moreover, improper healthcare provision can have additional effects on patients, other healthcare workers, and the overall reputation of the healthcare institution [29]. The negative emotions experienced by nurses after a patient safety incident can gradually improve. However, the lingering impact of such incidents can remain deeply distressing for an extended period [7], underscoring the urgency for timely resolution. As such, healthcare institutions need to ascertain the current state of second victims, explore related factors, and prepare individualized interventions for second victims depending on their symptoms [7]. Understanding the unique requirements of healthcare professionals is crucial when crafting targeted support programs for nurses affected by patient safety incidents [30]. Notably, distress experienced by these second victims can significantly influence work-related outcomes,

including intentions to leave their positions and increased absenteeism; organizational support has also been reported to show a full mediation effect [26]. Therefore, to reduce turnover and absenteeism among nurses who have experienced patient safety incidents, it will be necessary to proactively develop support measures at the organizational level.

The third theme cluster centered on the "sincere desire to prevent patient safety incidents in pediatric patients." Nurses often perceived the risk of patient safety incidence while observing caregivers who were not paying sufficient attention to the patient. Following patient safety incidents, there is a prevalent tendency among caregivers to place blame on the nurses, with organizations also primarily holding the staff accountable. Nurses articulated a strong desire for acknowledgment and respect from caregivers, coupled with the establishment of a robust patient safety culture within their institutions. Many nurses conveyed a sense of disappointment with the existing conditions. The majority emphasized the urgency of bolstering nurse staffing levels to enhance patient safety. They also underscored the necessity for national policies aimed at augmenting pediatric healthcare fees and fortifying support systems for healthcare professionals, encompassing both physicians and nurses. Additionally, there is a pressing call for organizational and political backing to facilitate the creation and effective deployment of medical devices and materials tailored to the unique needs of children. Within healthcare institutions, nurses advocated for a range of initiatives, including comprehensive patient safety education to heighten caregivers' awareness and the establishment of specialized pediatric IV teams.

As part of its program for patient safety, the World Health Organization (WHO), recognizing the roles and values of patient participation, has demanded cooperation and partnership between patients, family, healthcare providers, and policymakers in constructing safer healthcare systems and has encouraged patients to be at the center of healthcare services [31]. The Joint Commission has also suggested patient and family participation as one of 7 types of evidence for safe, high-quality care [32], and patient participation is known to be a means of preventing healthcare errors [33]. Patient participation involves fostering an environment that encourages the active participation of patients, families, and caregivers in their care to improve the safety, quality, and patient-centricity of healthcare services [34]. Healthcare institutions have the potential to promote this active patient involvement as a strategic measure to safeguard patients' health and well-being [35]. According to previous studies, patient participation in nursing is essential to guarantee high-quality care [36]. This active involvement provides important information for diagnosis and treatment and can potentially help to improve healthcare systems [37]. Because treatment-related decisions for pediatric patients are made by their caregivers, in this respect, promoting caregiver participation will help to prevent patient safety incidents, improve caregivers' safety awareness, and help to achieve safe nursing.

In a study investigating healthcare workers' perspectives on pediatric patient safety culture [5], findings revealed that aspects like organizational continuous-learning improvement and feedback and communication on errors were notably strong among healthcare professionals, including nurses. However, areas such as management support for patient safety and adopting a nonpunitive approach to errors were perceived weakly. This suggests that while there are robust communication and feedback mechanisms in place following patient safety incidents, there is a distinct need for enhanced support and fostering a nonpunitive culture for healthcare workers. This is consistent with our findings, with the participants in our study reporting that, in the event of a patient safety incident, both caregivers and the organizations only blamed individual nurses for the accident, and the participants were disappointed at the lack of respect from caregivers and the failure to establish a patient safety culture within organizations.

Most of the nurses who participated in the study complained of the need to increase nurse staffing for patient safety and emphasized the need for national policies to raise pediatric healthcare fees and improve support for pediatric healthcare workers. In 2021, among public healthcare workers in South Korea, the number of clinical physicians was 2.6 physicians per 1,000 population, which was very low compared to the OECD average of 3.7 physicians per 1,000 population, and the number of clinical nurses, at 8.8 nurses per 1,000 population, was also lower than the OECD average of 9.8 nurses per 1,000 population [38]. The so-called pediatric department "open-run," where patients are waiting outside the doors at opening times for pediatric clinics, has become an everyday reality for parents [39]. Amidst the current climate of low birth rates in South Korea, healthcare fees for pediatrics are very low, and there is a high risk of legal disputes due to healthcare accidents, causing future residents to avoid applying to pediatric departments, thus threatening a collapse of the pediatric emergency care system [16]. Healthcare staff shortages are exacerbating workloads, which increases the risk of safety incidents; therefore, there is an urgent need for basic corrective measures.

Alongside national policies, nurses also reported the need for organizational support, such as the development and provision of medical devices and materials suited for pediatric patients. Nurses demanded specific activities and support for patient safety, such as improving patient safety education as a means of enhancing safety awareness among caregivers and forming specialized pediatric IV teams. It is critical to develop and implement safety-related education to prevent patient safety incidents from occurring at hospitals [7]. Since fall prevention education was effective at improving fall-related knowledge and preventive behaviors in caregivers of hospitalized children [40], we expect that the development and application of caregiver-targeted educational programs will help improve caregivers' awareness of patient safety. The preparation and implementation of these specific interventions could promote caregiver cooperation and accelerate the establishment of a patient safety culture in healthcare institutions.

5. Conclusions

In this study, we explored the experiences of nurses regarding patient safety incidents affecting hospitalized children, uncovering their sincere desire to prevent such incidents. It is imperative to devise organizational and policy initiatives that prioritize safeguarding both hospitalized children and nurses from patient safety incidents, incorporating the insights gleaned from this study. Within healthcare organizations, fostering a culture rooted in mutual understanding and respect is paramount. Fundamental steps include increasing nurse staffing, enhancing pediatric medical infrastructure, and formulating supportive policies. In this regard, nursing administrators and healthcare institutions must collaborate to strategize and advocate for pertinent policies at the organizational level.

6. Implications for Nursing Management

Considering the characteristics of patient safety incidents in children, caregivers' trust and respect for nurses, as well as their cooperation and participation in the patient care process, are crucial. Therefore, specific strategies are required to strengthen patient safety activities within hospitals. These strategies include educational programs aimed at improving caregivers' awareness and understanding of patient safety. Additionally, developing and implementing psychological support and counseling services, as well as peer support programs, can assist nurses in mitigating and overcoming the negative emotions associated with patient safety incidents.

Providing continuous education programs to enhance nurses' work efficiency and job satisfaction and establishing clear career paths for the professional development of pediatric nurses are critical considerations for organizational managers. Given the current characteristics of Korean society, such as having the world's lowest birth rate and the increased workload burden consequent on the decrease in pediatric specialists and infrastructure, it is imperative to devise long-term strategies to reduce the workload of pediatric nurses and safeguard them from patient safety incidents. This includes policy support for expanding the number of nurses and enhancing the infrastructure of pediatric hospitals.

A comprehensive set of policies should be developed to address the specific challenges facing pediatric nurses in the context of Korea's extremely low birth rate. These policies should support pediatric nurses by mandating rest periods, ensuring safe staffing ratios, and providing professional development opportunities. By integrating these innovative actions with context-specific insights, it will be possible to formulate comprehensive measures that effectively support pediatric nurses. Although Korea's low birth rate presents unique challenges, the strategies developed could offer valuable lessons for other countries facing similar issues in pediatric care.

To this end, active intervention and cooperation from nursing managers and policymakers are essential. Their involvement is crucial in the development and

implementation of these policies and strategies, ensuring that pediatric nurses receive the needed support to deliver safe and effective care to their patients.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Disclosure

The funding did not influence the study's design, data collection, analysis, interpretation, or writing of the manuscript.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Supplementary 1 include the interview guideline of this manuscript. (*Supplementary Materials*)

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Research Article

Nurses' Readiness for Catastrophe Management and Its Relation to Their Organizational Commitment: Recommendations for Education

Aziza Z. Ali,^{1,2} Sameer A. Alkubati ,^{3,4} Ahmad K. Al-Sadi,³ Wessam A. Elsayed,^{1,5} Shaimaa M. Nageeb,^{6,7} Nahed M. Saber,^{8,9} Sara F. Alenizi,⁶ Seham S. Alanazi,¹ Mohammad J. Alkuwaisi,³ and Laila A. Hamed ^{3,10}

¹Nursing Administration Department, Faculty of Nursing, University of Hail, Hail, Saudi Arabia

²Nursing Administration Department, Faculty of Nursing, Benha University, Benha, Egypt

³Medical Surgical Nursing Department, College of Nursing, University of Hail, Hail, Saudi Arabia

⁴Department of Nursing, Faculty of Medicine and Health Sciences, Hodeida University, Hodeida, Yemen

⁵Nursing Administration Department, Faculty of Nursing, Mansoura University, Mansoura, Egypt

⁶Psychiatric and Mental Health Nursing, Faculty of Nursing, Hail University, Hail, Saudi Arabia

⁷Psychiatric and Mental Health Nursing, Faculty of Nursing, Zagazig University, Zagazig, Egypt

⁸Maternal and Newborn Nursing, Faculty of Nursing, Beni-Suef University, Cairo, Egypt

⁹Maternal and Child Health Nursing, Faculty of Nursing, University of Hail, Hail, Saudi Arabia

¹⁰Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Zagazig, Egypt

Correspondence should be addressed to Sameer A. Alkubati; alkubatisa@yahoo.com

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Background. Catastrophes are challenging events for nations and health systems that require healthcare providers, especially nurses, to be prepared to respond effectively. Although nurses play a critical role in managing catastrophes and postcatastrophic situations, their preparedness is often inadequate and affected by their organizational commitment. Therefore, this study assessed nurses' preparedness for catastrophe management and its relationship with their organizational commitment. **Methods.** A cross-sectional correlational, descriptive design involving 286 conveniently sampled nurses was conducted in four public hospitals in Hail city. Data were collected using a questionnaire that compiled two tools: the Disaster Preparedness Evaluation Tool to assess nurses' preparedness for catastrophe management and the Organizational Commitment Scale to assess their attachment to their hospitals. Correlations between mean scores of nurses' knowledge, skills, and preparedness for postcatastrophe management and organizational commitment were tested using Spearman's correlation, with a significance level of <0.05 . **Results.** Most nurses had low levels of knowledge (79.7%), skills (78.7%), and preparedness for postcatastrophe management (78.7% each). Meanwhile, 57.3% of nurses had low levels of affective commitment to their hospitals, compared to 78.7% for continuance and normative commitments. Statistically significant positive, moderate correlations were found between nurses' knowledge and skills in managing catastrophes ($r=0.512$; $p<0.01$) and knowledge and preparedness for postcatastrophe management ($r=0.492$; $p<0.01$), as well as nurses' skills and preparedness for postcatastrophe management ($r=0.533$; $p<0.01$). However, the nurses' level of organizational commitment was not significantly correlated with their knowledge, skills, or preparedness for postcatastrophe management. **Conclusion.** Nurses in Hail city are not adequately prepared to respond to and manage catastrophes and postcatastrophic situations, and they have low organizational commitments to their hospitals. Therefore, nursing education should integrate catastrophe management into the curricula, and hospital administrators should prioritize a supportive work environment that strengthens organizational commitment and provides ongoing education and regular training to improve nurses' preparedness for catastrophe management.

1. Introduction

Throughout history, catastrophic events have threatened entire nations and civilizations and resulted in lasting impacts on people's lives at various economic, social, and political levels. These impacts include death, disability, financial loss, and deterioration in living standards [1]. As catastrophes occur more frequently now than ever before, nurses must be well-prepared to respond and mitigate the negative effects they have on the affected population [2]. Despite efforts to prepare nurses for catastrophic events, they are still not adequately prepared to manage such situations. However, nurses' substantial contributions to global catastrophe relief efforts have been documented [3]. In 2015, natural catastrophes occurred in 99 countries, resulting in the displacement of millions of people, over 22,000 deaths, and an estimated economic loss of 70.3 billion USD [4].

A catastrophe is defined as any event that results in a dangerous and unstable situation that impacts a person, a group, or the entire society [5]. Unfavorable changes in human or environmental circumstances are called crises, especially when they occur unexpectedly and without warning. In a broader sense, a catastrophe is a difficult situation or an emergency. In other words, it is a "complex system" for the family, economy, and society that is disorganized [6].

Catastrophe nursing involves the systematic application of nursing knowledge and skills to address the challenges caused by catastrophes. It involves developing and implementing evidence-based practices to minimize the adverse health impacts of catastrophes and mitigate their life-threatening hazards [1]. A recent study showed that inadequate preparedness, inadequate formal training, limited empirical research, ethical and legal considerations, and concerns about personal safety and well-being during a catastrophe response are the most common challenges nurses face when responding to catastrophic events [7]. The lack of specificity in the extensive research in this area makes it necessary to identify the competencies required for the intended audiences and for different catastrophe situations and environments [8, 9].

Nurses' awareness of catastrophic events has increased in recent decades, but there remains a compelling need for further enhancement [10]. Many nurses lack the necessary psychological and educational preparedness to respond effectively to catastrophes [11–13]. Furthermore, much larger catastrophes are expected in the future, highlighting the need for greater awareness and preparedness. As a result, nurses should receive regular training in this area to keep their skills up-to-date [14, 15]. Since nurses play a vital role and are engaged in all phases of catastrophe response and management, it is important to provide them with the necessary knowledge, skills, and competencies and enhance their organizational commitment to effectively manage catastrophic events [16–18].

Organizational commitment refers to the psychological attachment that an employee feels toward a certain organization, which is characterized by alignment with its goals and values, as well as a strong desire to continue working

there [19]. Nurses' organizational commitment is a critical factor in the success and effectiveness of healthcare facilities [20]. This commitment critically depends on the attitudes and behaviors of nurses, particularly when there are unmet expectations or limited resources [21]. Nurses who are highly committed to their organizations are more productive due to their dedication, loyalty, and sense of responsibility [6, 22].

Assessment of organizational commitment is important to understand staff nurses' commitment to the organization's mission and promote consistent work conduct [23], which can positively impact their performance, motivation, and attachment to the organization [24]. A recent study in Saudi Arabia by Al Harthi et al. [25] revealed certain strategies that could improve nursing management during disasters, such as providing personal protective equipment to nurses to reduce the risk of infection, developing assessment tools, and recognizing nurses for their efforts to reduce stress during a disaster [25]. More recently, Al Dulijand et al. [26] found lower rates of knowledge about incident command systems (49.9%) and mass casualty plans (56.1%) among healthcare workers in Saudi Arabia. The authors emphasized the need for targeted initiatives to improve their knowledge and training in these areas of disaster preparedness [26].

Several studies have focused on the social and environmental impacts of catastrophes [27, 28], but research on the relationship between nurses' organizational commitment and their readiness to manage catastrophes is limited. Although nurses are among the frontline responders during catastrophic events, their organizational commitment plays an important role in their ability to provide effective care to patients affected by these catastrophes [29]. In this regard, a positive relationship has been found between organizational commitment and nurses' ability to manage emergencies [22]. Therefore, this study aimed to assess nurses' preparedness for catastrophe management (knowledge, skills, and preparedness for post-catastrophe management) and its correlation with their level of organizational commitment.

1.1. Research Questions

- (1) What was the level of nurses' preparedness for catastrophe management?
- (2) What was the level of nurses' organizational commitment?
- (3) Was there a relationship between nurses' preparedness for catastrophe management and their organizational commitment?

2. Methods

2.1. Design. A cross-sectional correlational design was used. This study fulfilled the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline [30].

2.2. Setting. This study was conducted in four main public hospitals in Hail city, Saudi Arabia: King Salman Hospital (500 beds), Hail General Hospital (136 beds), King Khaled Hospital (285 beds), and Maternity and Children's Hospital (200 beds).

2.3. Sampling Technique. A convenience sampling technique was used in this study. Considering a total of 1120 nurses in the four study hospitals, a minimum sample size of 286 was determined using the Raosoft® sample size calculator (https://www.raosoft.com/sample_size.html), based on a 50% response distribution, a 95% confidence level, and a 5% accepted margin of error. The final sample consisted of 55 nurses from King Salman Hospital, 46 from Hail General Hospital, 85 from King Khaled Hospital, and 100 from Maternity and Children's Hospital.

The study included nurses who had a diploma or higher degree in nursing with at least one year of work experience, had worked as registered nurses in the selected hospitals, and agreed to voluntarily participate in the study. Assistant nurses, those with less than one year of work experience, and those who refused to give informed consent were excluded from the study.

2.4. Study Instruments. Data were collected using a questionnaire that compiled two tools: the Disaster Preparedness Evaluation Tool (DPET) and the Organizational Commitment Scale (OCS). Furthermore, the questionnaire included questions about the characteristics of nurses, including age, gender, nationality, qualification, work experience, number of hours worked per week, hospital affiliation, and involvement in real catastrophe management.

The Arabic version of the DPET, which was translated and validated by Al Khalailah et al. [31], was used to assess nurses' perceptions of their preparedness for catastrophe management in three dimensions: knowledge, skills, and preparedness for postcatastrophe response and management [31]. It comprised the following 45 items: knowledge (13 items), skills (11 items), and postdisaster management (21 items). Nurses' responses to each item were rated on a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). Accordingly, the total scores for each participant ranged from 13 to 78 for knowledge, 11 to 66 for skills, and 21 to 126 for preparedness for postcatastrophe management, with higher scores indicating higher levels of preparedness. To calculate the mean total score for each dimension, the individual scores of participants for that dimension were summed and divided by the maximum possible score. The mean total scores were then converted into percentages by multiplying by 100. Based on the mean total percentage, the level of preparedness in each dimension was classified as low (<60%), moderate (60–75%), and high (>75%) [32–34].

The OCS was originally developed by Meyer and Allen in 1990 [35] and later updated in 1993 [36]. This scale comprised 18 items, divided evenly into three subscales: affective commitment, continuance commitment, and normative commitment. Nurses' responses to each item were rated on

a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). To ensure consistent interpretation of responses, negatively worded items (3, 4, 5, and 13) were reverse scored. The mean organizational commitment score was calculated by summing the individual scores and dividing by the maximum possible score. The mean overall percentage of organizational commitment was then calculated by multiplying the mean total score by 100. Based on the mean overall percentage, nurses' organizational commitment was classified as low (<60%), moderate (60–75%), and high (>75%) [32–34].

2.5. Instrument Validity and Reliability. A panel of five nursing administration academics from five nursing faculties at the universities of Benha, Ain Shams, Menoufia, Tanta, and Zagazig in Egypt evaluated the study instruments for their face and content validity. They evaluated the instrument items for conciseness, accuracy, completeness, and relevance. They approved the instrument tools after minor adjustments. Prior to actual data collection, a pilot study was conducted on 29 nurses, who were not included in the final statistical analysis of the study, to assess the feasibility, applicability, and clarity of the tools. According to this study, the estimated time to complete the questionnaire was 20–25 minutes.

The reliability of the study instrument was high, as revealed by Cronbach's alpha, with coefficients of 0.983, 0.986, and 0.996 for the knowledge, skills, and post-catastrophe management dimensions of the DPET, respectively, and 0.997, 0.991, and 0.995 for the affective, continuance, and normative commitment subscales of the OCS, respectively.

2.6. Fieldwork. Data were collected between July and the end of August 2023. The researchers provided nurses with a clear explanation of the study objectives and the process for completing the questionnaire. The head nurse of each unit scheduled the nurses' working hours based on their workload, and the researchers distributed the questionnaires and consent forms to the nurses at the scheduled times. The completed questionnaires were collected daily during the morning and afternoon shifts.

2.7. Ethical Considerations. This study received ethical approval from the Hail Research Ethics Committee (REC) (REC no. H-2023-316). The purpose of the study was clearly explained to eligible nurses before informed consent was obtained from those willing to voluntarily participate in the study. Nurses were informed that they had the right to withdraw from the study without consequences and that their data would only be used for research and analysis purposes. Nurses' privacy and the confidentiality of their data were strictly guaranteed.

2.8. Data Analysis. Data were coded and entered into Microsoft Excel spreadsheets for verification. They were then exported to IBM SPSS Statistics for Windows, version 25

(IBM Corp., Armonk, NY, USA) for subsequent analysis. Quantitative data were presented as mean and standard deviation (SD) for normally distributed data, or as median and interquartile range for nonnormally distributed data. Categorical data were presented as frequencies and percentages. The Mann–Whitney *U* test or Kruskal–Wallis *H* test was used to compare the median scores of nonnormally distributed data according to nurses' characteristics. In addition, Spearman's correlation was used to test the relationship between the mean total scores for knowledge, skills, and preparedness for postcatastrophe management and organizational commitment. Statistical significance was set at a *p* value of <0.05.

3. Results

3.1. Characteristics of the Respondent Nurses. The mean age of respondent nurses in this study was 32.1 ± 7.6 years, with most nurses aged 21–30 years (45.4%), followed by those aged 31–40 years (40.5%). The majority of nurses were females (81.1%), non-Saudi nationals (73.8%), and married (94.8%). Of the married and divorced nurses, 95.1% had children. Regarding qualifications, most nurses held a bachelor's degree in nursing or higher (72%), while the remainder had a diploma degree. The mean length of nurses' work experience was 9.7 ± 7.6 years (range: 1–28), with more than half having 1–9 years of experience. Most nurses were affiliated with the Maternity and Children's Hospital and King Khaled Hospital (35.0% and 29.7%, respectively) and reported no prior experience in catastrophe management (78.3%). On average, nurses cared for 6.0 ± 2.0 patients per shift and worked 8.7 ± 1.5 hours per day (Table 1).

3.2. Nurses' Preparedness for Catastrophe Management. The mean total scores for nurses' knowledge, skills, and preparedness for postcatastrophe management were 2.34 ± 1.26 , 2.96 ± 1.18 , and 2.88 ± 1.22 , respectively, corresponding to a tendency toward disagreement (Table 2).

Regarding the level of preparedness, Figure 1 shows that most nurses had low levels of knowledge about catastrophe management (79.7%), compared with 7% and 13.3% for moderate and high levels of knowledge, respectively. Similarly, most nurses had low levels of catastrophe management skills (78.7%), compared with 6.6% and 14.7% for moderate and high levels of skills, respectively. In addition, low levels of preparedness for postcatastrophe management were observed in 78.7% of nurses, compared with 5.6% and 15.7% for moderate and high levels of postcatastrophe management, respectively.

3.3. Nurses' Organizational Commitment. The mean total scores for nurses' affective, continuance, and normative organizational commitments to their hospitals were 2.54 ± 1.25 , 2.07 ± 1.36 , and 2.39 ± 1.22 , respectively, corresponding to a tendency toward disagreement. Furthermore, the level of organizational commitment was low, with a mean total score of 2.33 ± 1.22 (Table 3).

TABLE 1: Characteristics of respondent nurses included in the study (*N* = 286).

Characteristics	<i>n</i> (%)
Age (years)	
21–30	130 (45.5)
31–40	116 (40.5)
≥41	40 (14.0)
Mean ± SD	32.1 ± 7.6
Gender	
Male	54 (18.9)
Female	232 (81.1)
Nationality	
Saudi	75 (26.2)
Non-Saudi	211 (73.8)
Marital status	
Single/divorced	15 (5.2)
Married	271 (94.8)
Having children	
No	14 (4.9)
Yes	272 (95.1)
Qualification	
Diploma	80 (28.0)
Bachelor's or higher	206 (72.0)
Length of professional experience (years)	
1–9	150 (52.4)
10–19	105 (36.7)
20–28	31 (10.8)
Mean ± SD	9.7 ± 7.2
Hospital affiliation	
Hail General Hospital	46 (16.1)
King Salman Hospital	55 (19.2)
King Khaled Hospital	85 (29.7)
Maternity and Children's Hospital	100 (35.0)
Involvement in real catastrophe management	
No	224 (78.3)
Yes	62 (21.7)
Number of patients per shift	
Mean ± SD	6.0 ± 2.0
Daily work hours	
Mean ± SD	8.7 ± 1.5

SD, standard deviation.

Regarding the levels of organizational commitment, Figure 2 shows that 57.3% of nurses had low levels of affective commitment to their hospitals, compared with 78.7% for continuance and normative commitments. In contrast, 21.3% of nurses demonstrated high levels of commitment to their hospitals on all three subscales of organizational commitment. However, moderate levels of affective commitment to hospitals were observed for 21.3% of the nurses, with no nurses demonstrating moderate levels of continuance or normative commitment.

3.4. Relationship between Nurses' Preparedness for Catastrophe Management and Their Organizational Commitment. Statistically significant positive, moderate correlations were found between nurses' knowledge and skills in managing catastrophes ($r = 0.512$; $p < 0.01$), knowledge and preparedness for postcatastrophe management ($r = 0.492$; $p < 0.01$), as well as nurses' skills and preparedness for

TABLE 2: Preparedness for catastrophe management among nurses.

Preparedness dimension	Mean score \pm SD*	Direction
Knowledge	2.34 \pm 1.26	Disagree
Skills	2.96 \pm 1.18	Disagree
Preparedness for postcatastrophe management	2.88 \pm 1.22	Disagree

*The total number of respondent nurses was 286. SD, standard deviation.

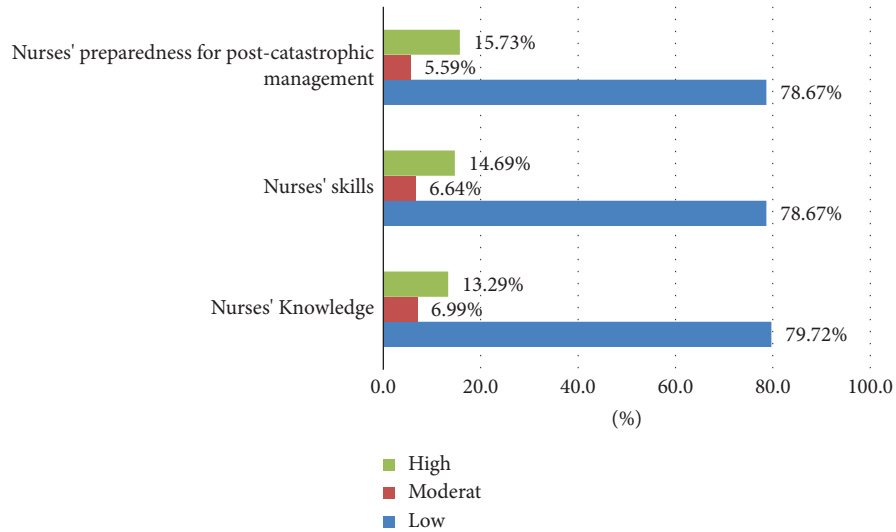


FIGURE 1: Preparedness levels for catastrophe management among nurses.

TABLE 3: Organizational commitment of nurses.

Commitment subscale	Mean score \pm SD*	Direction
Affective commitment	2.54 \pm 1.25	Disagree
Continuance commitment	2.07 \pm 1.36	Disagree
Normative commitment	2.39 \pm 1.22	Disagree
Level of commitment	2.33 \pm 0.82	Low

*The total number of respondent nurses was 286. SD, standard deviation.

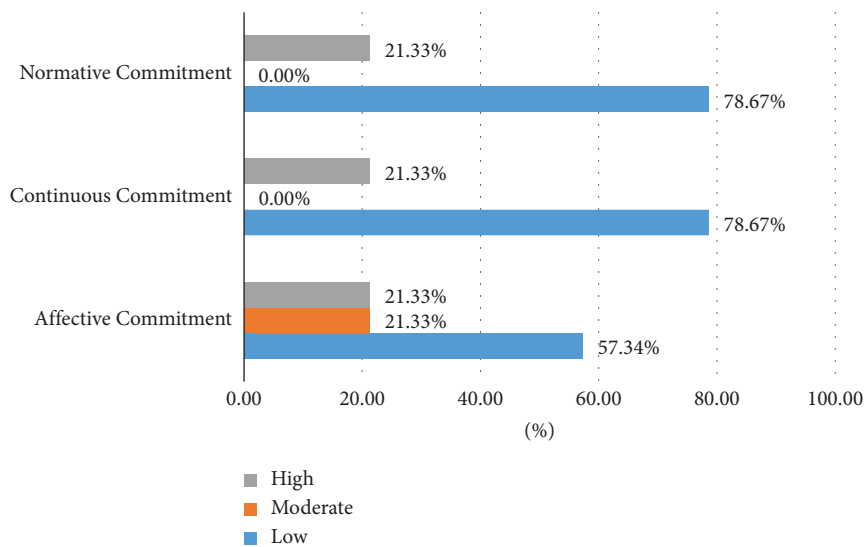


FIGURE 2: Levels of organizational commitment among nurses.

postcatastrophe management ($r = 0.533$; $p < 0.01$). However, the nurses' level of organizational commitment was not significantly correlated with their knowledge, skills, or preparedness for postcatastrophe management (Table 4).

3.5. Differences in Nurses' Preparedness for Catastrophe Management and Organizational Commitment according to Their Characteristics. The median score for organizational commitment was significantly higher among single/divorced nurses ($P = 0.001$), nurses without children ($P = 0.001$), and those previously involved in real catastrophe management ($P = 0.001$) than among their counterparts. The median score of catastrophe management skills was significantly higher among nurses aged 21–30 years ($P = 0.001$) and nurses with 1–9 years of experience ($P = 0.008$) than among their counterparts, while the median score of postcatastrophe management was significantly higher among nurses aged 21–30 years and 31–40 years than those aged 40 years or older. However, no statistically significant differences were observed in the median knowledge scores according to nurses' characteristics (Table 5).

4. Discussion

By leveraging available resources and tools to prepare for catastrophes, catastrophe management provides a framework for managing the prevention and mitigation of negative consequences [37]. In this context, nurses must have the necessary knowledge and skills and be well-prepared to respond to and manage catastrophes effectively. Therefore, it is important to assess nurses' preparedness for catastrophe management and understand its relationship with their organizational commitment. To the best of our knowledge, this is the first study to assess the preparedness of nurses in public hospitals in Hail city in the northern region of Saudi Arabia for catastrophe management and its relationship with their organizational commitment.

The preparedness of nurses in the present study for catastrophe management was inadequate, as evidenced by their low levels of knowledge, skills, and preparedness for postcatastrophe management. This finding emphasizes the need for bolstering education and training in catastrophe management to improve their preparedness for responding to and managing potentially emerging catastrophes. As the likelihood of catastrophes in the future is on the rise, nurses should regularly undergo training in catastrophe management to ensure their skills remain up-to-date. The low preparedness of nurses could be due to the hospitals included in this study not prioritizing nursing training in risk management, considering that these hospitals are equipped with advanced technology aimed at protecting both patients and caregivers from potential risks. In accordance with the present study, it was found that most nursing students in Turkey lack the psychological and educational foundation required for responsible crisis response [14]. Similarly, Hasan et al. [37] found that nurses in Dhaka city, Bangladesh, had average levels of knowledge, skills, and catastrophe preparedness, suggesting that further training is needed to

effectively manage catastrophes. In addition, nurses in Jordan and the Asia-Pacific region have been found to have low-to-moderate levels of preparedness for catastrophic events [31, 38].

This study also found nurses' low commitment to their hospitals, which may be attributed in part to their perception of being disconnected from these hospitals due to their inability to engage in decision-making and fewer opportunities to interact directly with supervisors. In addition, hospitals may lack clear communication channels in this regard. Many nurses may also have little experience and lack emotional attachment to their hospitals. This finding contradicts the finding of Elzohairy et al. [39], who found that professional nurses in Damanhur, Egypt, had moderate organizational commitment. Moreover, Callado et al. reported that primary healthcare nurses were highly committed to their organizations [40].

The significant positive moderate correlation between nurses' knowledge and their skills in managing catastrophes in the present study suggests a logical direct relationship between these two factors. In this regard, more knowledgeable nurses tend to be more skilled at dealing with catastrophic situations, reflecting the importance of nursing education in catastrophe management to improve nurses' ability to respond to and manage catastrophes effectively. This finding is consistent with the findings of Hasan et al. [37], who revealed such a relationship among nurses in Dhaka city. Furthermore, the significant positive moderate correlation between nurses' knowledge and preparedness for catastrophe management in the present study could be attributed to the willingness of knowledgeable nurses to learn, practice, and acquire the skills required to deal with catastrophic situations. This finding also agrees with that reported among nurses in Dhaka city [37]. On the other hand, the nurses' level of skills in the present was significantly and positively correlated with their preparedness for post-catastrophe management, suggesting that better skills are linked to higher preparedness. This finding agrees with that reported among nurses in Dhaka city [37].

Despite not finding a significant correlation between nurses' preparedness for catastrophe management and their organizational commitment, it is possible that this commitment still indirectly affects their preparedness. Various factors, including emotional attachment to their hospitals, involvement in decision-making, direct interaction with supervisors, and clear communication channels within the hospital, influence nurses' organizational commitment. Nurses who are committed to their organizations may be more likely to pursue professional development that can improve their catastrophe management knowledge and skills. In contrast to the present finding, a positive correlation was found between Indonesian nurses' organizational commitment and their preparedness for dealing with patients during natural catastrophes [22].

The present study found that organizational commitment increased significantly among single or divorced nurses, those who had no children, and nurses with prior involvement in real catastrophe management. It is plausible that the fewer family-related obligations or distractions of

TABLE 4: Correlation between nurses' preparedness for catastrophe management dimensions and organizational commitment.

Items	Knowledge	Skills	Postcatastrophe management	Organizational commitment
Knowledge	1			
Skills	0.512**	1		
Postcatastrophe management	0.492**	0.533**	1	
Organizational commitment	0.011	-0.010	0.031	1

**Statistically significant ($p < 0.01$).

TABLE 5: Differences in preparedness for catastrophe management dimensions and organizational commitment among nurses according to their characteristics.

Variables	N	Knowledge		Skills		Preparedness for postcatastrophe management		Organizational commitment	
		Median (IQR)	<i>p</i> value	Median (IQR)	<i>p</i> value	Median (IQR)	<i>p</i> value	Median (IQR)	<i>p</i> value
Gender									
Male	54	2.08 (1.52)	0.960	2.18 (0.84)	0.64	2.57 (0.95)	0.59	2.00 (2.33)	0.20
Female	232	2.08 (2.00)		2.82 (0.98)		2.57 (1.00)		1.92 (0.44)	
Marital status									
Single/divorced	15	2.08 (1.69)	0.68	3.00 (0.82)	0.69	2.09 (1.14)	0.35	4.00 (2.89)	0.001
Married	271	2.08 (2.00)		2.82 (0.91)		2.57 (1.00)		1.94 (0.44)	
Nationality									
Saudi	75	2.08 (1.69)	0.83	2.18 (1.00)	0.87	2.57 (1.00)	0.73	1.78 (0.44)	0.33
Non-Saudi	211	2.08 (2.00)		2.82 (0.91)		2.52 (1.00)		2.0 (0.67)	
Having a child									
No	14	2.08 (1.69)	0.96	2.59 (0.86)	0.96	2.17 (1.00)	0.23	4.00 (2.97)	0.001
Yes	272	2.08 (2.00)		2.82 (0.91)		2.57 (1.00)		1.94 (0.44)	
Qualification									
Diploma	80	2.08 (2.46)	0.08	3.00 (2.61)	0.28	2.57 (2.40)	0.17	2.00 (0.67)	0.53
Bachelor's or higher	206	2.08 (1.52)		2.18 (0.91)		2.55 (0.96)		1.89 (0.44)	
Involvement in real catastrophe management									
No	224	2.08 (2.00)	0.92	2.50 (1.00)	0.70	2.57 (1.00)	0.32	1.72 (0.50)	0.001
Yes	62	2.08 (1.69)		2.81 (0.82)		2.31 (1.00)		4.61 (0.94)	
Age (years)									
21–30	130	2.08 (2.50)	0.13	3.00 (2.02)	0.001	2.75 (2.15)	0.016	1.83 (0.44)	0.497
31–40	116	2.08 (1.08)		2.18 (1.00)		2.75 (1.00)		1.97 (0.63)	
≥41	40	2.08 (1.31)		2.18 (1.00)		2.00 (0.54)		2.00 (1.92)	
Length of work experience (years)									
1–9	150	2.08 (2.00)	0.34	3.00 (0.82)	0.008	2.52 (0.96)	0.35	1.89 (0.44)	0.69
10–19	105	2.08 (1.31)		2.18 (1.00)		2.57 (1.00)		1.94 (1.50)	
20–28	31	2.31 (2.38)		2.82 (2.09)		2.00 (2.10)		2.00 (0.67)	
Hospital affiliation									
HGH	46	2.08 (3.46)	0.08	3.00 (2.36)	0.001	2.57 (2.63)	0.007	1.67 (0.57)	0.019
KSH	55	2.08 (1.08)		2.18 (1.00)		2.52 (0.76)		2.00 (0.61)	
KKH	85	2.08 (1.08)		3.00 (0.82)		2.09 (0.95)		1.72 (2.39)	
MCH	100	2.08 (2.37)		3.00 (2.07)		2.67 (2.12)		2.00 (0.44)	

IQR, interquartile range; HGH, Hail General Hospital; KSH, King Salman Hospital; KKH, King Khaled Hospital; MCH, Maternity and Children's Hospital. The bold values indicate $p < 0.05$.

these nurses may allow them to dedicate more time to their organizational goals, enhancing their organizational commitment. On the other hand, the struggle to balance work and family obligations can often dilute nurses' commitment to their organizations. Personal circumstances, such as marriage and childcare responsibilities and preoccupation with family matters can negatively influence nurses' commitment to their organizations. In contrast, a previous study in Saudi Arabia found that married nurses had significantly higher levels of organizational commitment [41].

Nurses' level of skills in the present study increased significantly by their age and experience. Similarly, nurses with less than three years of experience in Saudi Arabia were found to need more catastrophe management training [7]. On the other hand, the increase in nurses' organizational commitment because of their experience in catastrophe management could be attributed to the fact that the acquired nurses' experience enhances their loyalty to the organization by deepening their understanding of institutional policies, regulations, and procedures. Consequently, greater

experience is associated with greater organizational commitment. In contrast to the present study, Alammam et al. [42] found no significant difference in Omani nurses' organizational commitment according to their years of experience. However, the present study found a decrease in nurses' preparedness for catastrophe management with their age increase, which is contrary to the common belief that learning and cognitive skills for education increase with age. This finding is consistent with previous studies among nurses in Japan and Iran [43, 44].

This study provides valuable information about the preparedness of nursing staff in Hail city for catastrophe management. However, there are several limitations that may affect the interpretation of the results. The cross-sectional correlational design of this study makes it difficult to establish a causal relationship between nurses' preparedness for catastrophe management and their organizational commitment, as well as other potential influencing factors. In addition, restricting the study to public hospitals and relying on convenience sampling also contribute to the limited generalizability of the results to the broader nursing population in the city. It is worth mentioning that nurses in the private sector may face different situations, working conditions, and organizational structures that may lead to different scenarios regarding the topic under study. Therefore, large-scale studies with more representative samples, along with longitudinal designs, are recommended to assess the relationship between nurses' preparedness for catastrophe management and their organizational commitment.

4.1. Implications for Practice, Research, and Education. Greater commitment of nurses to their hospitals increases the likelihood of adequate preparedness to deal with catastrophic events effectively. Therefore, hospitals should prioritize improving the organizational commitment of their nursing staff by fostering a supportive work environment. In addition, it is crucial to implement strategies that strengthen nurses' attachment to their hospitals, such as offering opportunities for professional development and recognizing the positive contributions made by nurses. This study emphasizes the importance of integrating catastrophe management into nursing curricula and programs to improve nurses' knowledge and skills in preparing for and responding to catastrophes and post-catastrophic situations. Hospital administrators should also provide nurses with continuous education and regular training programs to keep them up-to-date and improve their capability to handle catastrophic events. The findings of this study warrant further studies to identify and predict potential factors affecting nurses' preparedness for catastrophe management, as well as the development of effective strategies that ensure a more efficient response and management of catastrophic events.

5. Conclusion

Nurses in Hail city are not adequately prepared to respond to and manage catastrophes and postcatastrophic situations, and they have low organizational commitments to their

hospitals. Therefore, nursing education should integrate catastrophe management into the curricula, and hospital administrators should prioritize a supportive work environment that strengthens organizational commitment and provides ongoing education and regular training to improve nurses' preparedness for catastrophe management.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Ethical Approval

Loyalty to entirely applicable ethical standards and legal requirements, involving the Helsinki Declaration, was precisely upheld through the research process. Ethical clearance was obtained from the Research Ethics Committee (REC) of Hail University (REC No. H-2023-316) on May 6, 2023.

Consent

The researchers obtained informed consent from nurses after an explanation of the objectives of the study. Moreover, nurses were given the right to refuse or withdraw from the study without any explanation. In addition, they gave assurances that the data would be kept private and anonymous and would only be utilized for scientific study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

All researchers in this study were involved in designing the study, conducting the survey and data collection, analyzing the data, and interpreting the results. Aziza Z. Ali, Sameer A. Alkubati, Wessam A. Elsayed, and Laila A. Hamed wrote the first draft of the paper and contributed to the revision of the whole paper. All authors have read and agreed to the published version of the manuscript.

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Review Article

Nurses' Workplace Social Capital and Sustainable Development: An Integrative Review of Empirical Studies

Jia-Min Xu ¹, Ming-Guo Cao ², Qian-Cheng Gao ², Yi-Xuan Lu ¹,
and Azadeh T. Stark ^{3,4}

¹Department of Nursing Sciences, School of Medicine, Lishui University, Lishui, China

²Department of Dentistry, School of Medicine, Lishui University, Lishui, China

³School of Interdisciplinary Studies, University of Texas at Dallas, Richardson, TX, USA

⁴Department of Pathology and Laboratory Medicine, Henry Ford Health, Detroit, MI, USA

Correspondence should be addressed to Jia-Min Xu; xujiamin@lsu.edu.cn

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Aim. The purpose of our review was to assess the role of nurses' workplace social capital in meeting the Sustainable Development Goals (SDGs) of the United Nations (UN). **Background.** In 2015, the 2030 Agenda for Sustainable Development with 17 universal goals was adopted by members of the UN. Although nurses have been acknowledged as important contributors to sustainable development, they still have difficulties in connecting their work to the SDGs. Nurses' workplace social capital is an important concept in nursing management due to its constructive consequences. However, the potential association between nurses' workplace social capital and the SDGs has not been evaluated. **Evaluation.** We conducted an integrative review, following the methodology of Whittemore and Knafl. Seven databases, Medline, CINAHL, Web of Science, Cochrane Library, Embase, PsycINFO, and Scopus with no restriction on publication year, were searched in May 2023 to identify statistically significant empirical evidence. Only peer-reviewed research papers published in English language journals were considered. We applied the Mixed Methods Appraisal Tool to evaluate the quality of the selected articles. We categorized outcomes of nurses' workplace social capital into themes and connected them to the SDGs through repeated comparisons and discussions. **Key Issues.** Twenty-nine of 2,188 retrieved articles were included in the final data analysis. Twenty-three outcomes of nurses' workplace social capital were identified, and three themes were abstracted. Nurses' workplace social capital is positively associated with SDG 3 (good health and well-being), SDG 8 (decent work and economic growth), and SDG 17 (partnerships for the goals). **Conclusion.** Findings of our integrative review shed light on the importance of nurses' workplace social capital and the role of nurses in achieving the global movement for sustainable development. **Implication for Nursing Management.** Investment in nursing workforce and nurses' workplace social capital can further strengthen the position of nurses to support and deliver the SDGs.

1. Introduction

The concept of sustainability was introduced to the field of management in the 1950s because of the negative environmental impacts of human actions [1]. In September 2015, the 2030 Agenda for Sustainable Development by the UN endorsed 17 universal and transformative SDGs [2]. These 17 goals address economic, social, and environmental aspects of sustainable development. People, Planet, Peace, Prosperity, and Partnership (5Ps) form the pillars of the SDGs, with a shared vision to build a peaceful and healthy

world [2, 3]. In 2020, the UN launched the Decade of Action plan, calling for the direct involvement of people, individually and collectively, to ascertain meeting the SDGs by 2030 [4].

Nurses carry a pivotal role in the sustainability movement of the healthcare industry. The statement by McMillan "the profession of nursing claims no geographical boundaries, working in diverse areas of health care. These range from outpost and global nursing to areas in policy development. Such diverse job profiles position nursing at the heart of the sustainability movement in health care" [[5], p.757]

underlines the importance of nurses' roles and responsibilities in achieving sustainability. Additionally, the International Council of Nurses (ICN) has cited practical case examples from different countries to endorse the importance of nurses' contributions to the 17 SDGs [6]. Nurses, on a daily basis, contribute to some, if not most, of the 17 SDGs even though they might not be cognizant of their contributions. Their routine professional responsibilities are part and parcel of the activities that can achieve the goals of sustainable development [6, 7].

The concept of social capital can be traced back to the early 20th century [8]. Workplace social capital, a concept under the umbrella term of social capital, explains the interactive relational networks in a workplace; it is the tenet of a healthy work environment that can protect employees' mental and psychological well-being and ensure their efficiency and effectiveness in delivering their professional responsibilities [9–11]. Workplace social capital has become more prominent in the healthcare industry because of the complexities of the delivery of healthcare services and therefore the interdependencies of healthcare professionals [12–14].

The concept of nurses' workplace social capital has been defined as *"a relational network configured by respectful interactions among nursing professionals and between the other healthcare professionals. These interactions are characterized by the norms of trust, reciprocity, shared understanding, and social cohesion"* [[14], p. 252]. Nurses' workplace social capital is a useful professional resource because it is a segue to a spectrum of positive outcomes for the healthcare industry, people, and the environment [13–15]. For example, nurses' workplace social capital has been attributed to safety and quality in the delivery of healthcare services, e.g., reduction of unnecessary duplication of services and/or medication errors or other interventions [16].

Does nurses' workplace social capital contribute to the SDGs of the UN? Despite the implicit evidence in practical cases [6], no research has been conducted to evaluate the association between these two pivotal concepts. Whitemore and Knafl [17] suggest that the approach of an integrative review allows bridging and connecting knowledge in providing a comprehensive and collective picture of a specific scientific phenomenon. In this integrative review, we attempt to demonstrate the association between nurses' workplace social capital and different domains of the SDGs based on empirical evidence. The results of our work should set the foundation for understanding the connection between nurses' workplace social capital and the SDGs; more importantly, our findings should shed further light on the critical roles of nurses in meeting the 2020 Decade of Action plan by the UN through their daily work responsibilities.

2. Methods

2.1. Study Design. We applied the integrative review approach of Whitemore and Knafl [17] to conduct our study. Five stages such as *Problem Identification, Literature Search, Data Evaluation, Data Analysis, and Presentation of the Findings* were implemented [17, 18].

2.2. Problem Identification. We reviewed the literature on social capital and sustainability to identify gaps in addressing the association between nurses' workplace social capital and the SDGs.

2.3. Literature Search Stage. Seven databases, Medline, CINAHL, Web of Science, Cochrane Library, Embase, PsycINFO, and Scopus, with no restriction on publication year, were searched to identify potential resources. In the initial stage of our search, we used the terms "social capital," "sustainable development," "sustainability," "nurses," and "nursing" with proper combination by the Boolean operators. Due to the limited number of identified publications, it became necessary to broaden the scope of our search; therefore, we used the terms "social capital," "nurses," "nurse," and "nursing" to identify the potential resources. The details of our search can be found in Supplementary Table 1. The final systematic search was completed on May 31st, 2023. Additionally, we reviewed references of the selected papers to identify additional resources.

2.3.1. Inclusion and Exclusion Criteria. We set three inclusion criteria: (1) empirical research papers that had assessed the direct or indirect association between nurses' workplace social capital and the SDGs; (2) English language publications; and (3) published in peer-reviewed journals. We did not discriminate on the method of empirical research, qualitative, quantitative, and mixed methods. We excluded empirical studies addressing patients' social capital, nursing students' social capital, and social capital among the other professionals. Furthermore, we eliminated studies that addressed social capital in circumstances other than the workplace; finally, we excluded studies of nurses' workplace social capital in which outcomes were not explicitly discussed.

2.3.2. Search Outcomes. An adapted PRISMA flow diagram was used to present the process and outcome of article selection [19] (Figure 1). Initially, a total of 2,188 potentially eligible records were identified from the selected seven databases. After removing duplicates using the EndNote software package, a total of 1,141 articles remained. The titles and abstracts of the remaining articles were then screened and a total of 176 articles remained for the full-text review. Of these, 150 articles were excluded for different reasons (Figure 1). Additionally, we reviewed references of the selected articles and retrieved three full-text papers. A total of 29 articles were included for the next stage, data evaluation. Two of the authors (QCG and YXL) conducted the literature search, while the screening process for meeting the inclusion criteria was performed by a third author (JMX). The result was confirmed by the team.

2.4. Data Evaluation Stage. We used the Mixed Methods Appraisal Tool (MMAT) to evaluate quality of the selected studies [20]. We justified the application of this tool because it is a comprehensive and a critical appraisal tool that can be

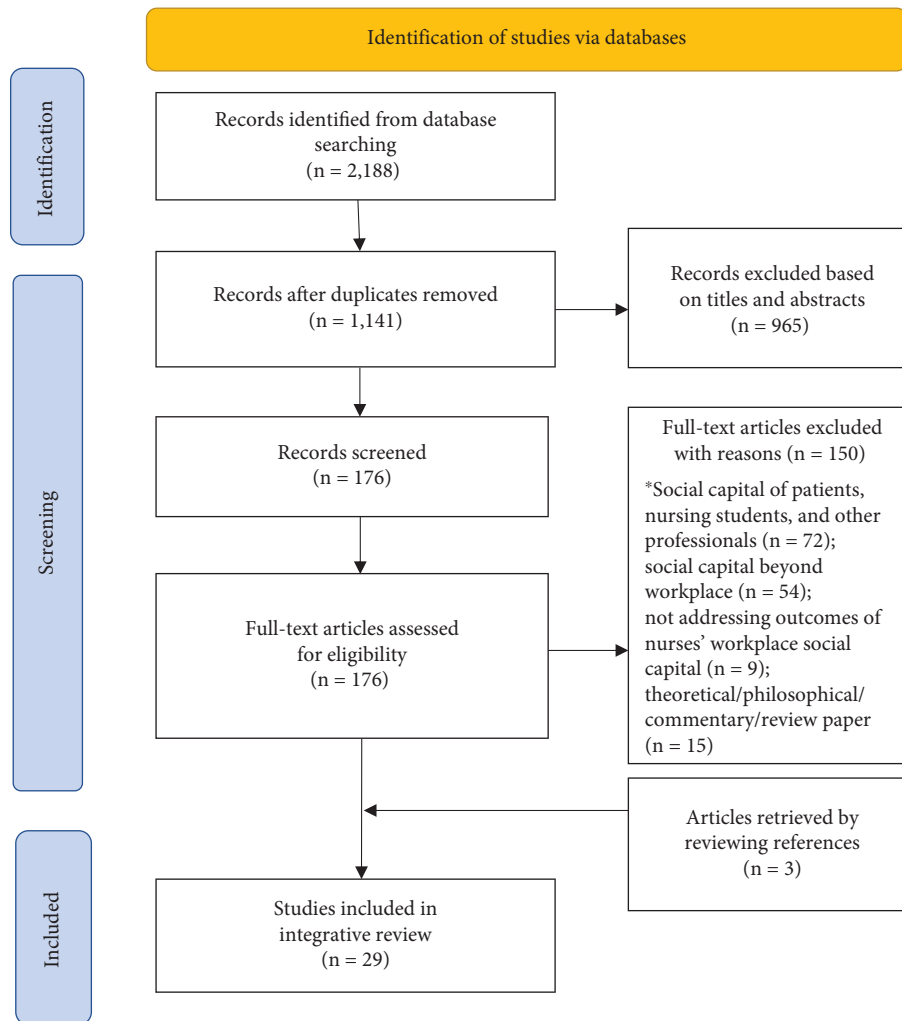


FIGURE 1: PRISMA flowchart for article selection.

used for different types of research including qualitative, quantitative, and mixed-methods studies (including instrument development and test) [20]. Initially, two of the authors (JMX and MGC) worked independently to critically evaluate the quality of the selected papers; disagreements were addressed by team discussions and by achieving a unanimous agreement among the authors. The details of the data appraisal are presented in Supplementary Table 2. No study was excluded in this process because the main purpose of our review was to integrate all empirical evidence of the contributions of nurses' workplace social capital to sustainable development. All the 29 identified articles were included in the next stage, data analysis.

2.5. Data Analysis Stage. The goal of data analysis in an integrative review is to summarize the data systematically and unbiasedly. The objective is to develop an innovative approach to synthesize data for the next stage which is the comprehensive presentation. The method of data analysis that we applied included data reduction, data display, data comparison, and drawing the conclusion and verification [17]. We developed a template to extract and display the

characteristics of the selected studies; the variables that we included in categorizing the data were reference, study design, sample size, main findings, and instruments (Table 1). First, we coded the data and then grouped them under the appropriate variables. Under the variable of "main findings," we classified the statistically significant outcomes of nurses' workplace social capital into themes (Figure 2). For example, the two reported outcomes "quality of care" and "patient safety" were clustered under the theme of "healthcare services management." Finally, we applied the technique of repeated comparisons and discussions to link outcomes under each theme to the 17 SDGs (Table 2). Two of the authors (JMX and MGC) prepared the initial data extraction and data categorization which were then confirmed and improved by all team members.

3. Results

3.1. Study Characteristics. The characteristics of the 29 selected studies are presented chronologically by the year of publication (Table 1). A broad spectrum of sample size, ranging from 8 to 1,201, was identified among these studies.

TABLE 1: Study characteristics.

Reference	Design	Sample size	Main findings (statistically significant outcomes of nurses' workplace social capital)	Instruments for the main findings
Kida et al. (2023) [21] (Japan)	Cross-sectional survey	659	Workplace social capital had direct effects on affective organizational commitment ($\beta = 0.302$, $p < 0.001$) and normative organizational commitment ($\beta = 0.231$, $p < 0.001$) Social capital (networks and networking) was a factor for positive retention intentions	Bonding Workplace Social Capital Scale; Organizational Commitment Scale in the Human Resource Management checklist
Fisher et al. (2022) [22] (UK)	Qualitative description	8	Workplace social capital was positively correlated with moral courage ($r = 0.29$, $p < 0.01$) and happiness ($r = 0.32$, $p < 0.01$) during the COVID-19 pandemic; social capital was a positive predictor of moral courage and happiness ($p < 0.001$) Social capital had a direct relationship with second victim severity ($\beta = -0.801$, $p < 0.001$) and psychological capital ($\beta = 0.778$, $p < 0.001$)	N/A
Pirdelkhosh et al. (2022) [23] (Iran)	Cross-sectional survey	169	Workplace social capital positively predicted professional identity during the COVID-19 outbreak ($\beta = 1.26$, $p < 0.001$) Increased social capital led to increased perception of quality of care ($\beta = 0.324$, $p < 0.05$) and personal accomplishment ($\beta = 0.269$, $p < 0.05$), and decreased emotional exhaustion ($\beta = -0.303$, $p < 0.05$) and depersonalization ($\beta = -0.186$, $p < 0.05$)	Onyx and Bullen Social Capital Questionnaire; Moral Courage Questionnaire; Oxford Happiness Inventory
Terri Hinkley (2022) [24] (USA)	Cross-sectional survey	999	As the social capital score increased, the job satisfaction score increased ($r = 0.313$, $p = 0.002$) Social capital in the form of social support is a major preventative strategy for workplace occupational injuries and accidents	Social Capital of Nursing (SCON); Second Victim Experience and Support Tool (SVEST); Psychological Capital Questionnaire (PCQ)
Zhang et al. (2021) [25] (mainland China)	Cross-sectional survey	308	Workplace social capital was positively related to work engagement ($r = 0.36$, $p = 0.01$) and negatively associated with turnover intention ($r = -0.40$, $p = 0.01$)	Chinese Workplace Social Capital Scale (eight-item measure); Chinese Nurse's Professional Identity Scale
Gensimore et al. (2020) [26] (USA)	Cross-sectional survey	507		A modified Social Capital Scale; the item measuring perception of unit quality (quality of care); Maslach Burnout Inventory
Gholami Motlagh et al. (2020) [27] (Iran)	Cross-sectional survey	99		Nahapiet and Ghoshal Social Capital Questionnaire; Minnesota Satisfaction Questionnaire (MSQ)
Hafeez et al. (2020) [28] (Pakistan)	Qualitative description	20		N/A
Norikoshi et al. (2020) [29] (Japan)	Mixed methods (instrument development and test)	Interviewed 32 nurses for item generation; 414 in the quantitative test stage		Relational Workplace Social Capital Scale for Japanese Nurses (RWSCS-JN); Japanese Short Version of the Utrecht Work Engagement Scale; Turnover Intention Scale

TABLE 1: Continued.

Reference	Design	Sample size	Main findings (statistically significant outcomes of nurses' workplace social capital)	Instruments for the main findings
Chang et al. (2019) [30] (Taiwan)	Cross-sectional survey	524	Social capital was positively related to normative professional commitment ($\beta = 0.34$, $p = 0.001$)	Modified Contextual Barriers and Supports Measure (Social Capital Subscale); items from Occupational Commitment Scale
Chang et al. (2019) [31] (Taiwan)	Cross-sectional survey	502	Social capital was positively related to intention to improve professional capabilities (path coefficient = 0.21, $p < 0.05$)	Modified Contextual Barriers and Supports Measure (Social Capital Subscale); Choice Goal Subscale)
Pham et al. (2019) [32] (Taiwan)	Cross-sectional survey	166	Mentor-mentee rapport (social capital relationships) was positively related to mentors' willingness to mentor ($\beta = 0.85$, $p < 0.001$) and mentees' willingness to be mentored ($\beta = 0.75$, $p < 0.001$)	Adapted items measuring rapport and willingness to mentor/be mentored
Jafari et al. (2018) [33] (Iran)	Cross-sectional survey	215	Social capital was positively related to clinical risk management ($r = 0.142$, $p = 0.040$)	Self-developed Social Capital Questionnaire; Risk Management Questionnaire
Middleton et al. (2018) [34] (Cyprus)	Cross-sectional survey	362	Increased odds of mental distress ($OR = 2.16$; 95% CI = 1.05, 4.42) and decreased self-rated health (mean difference = 8.4; 95% CI = 2.8, 14.0) were observed among nurses with the lowest level of workplace social capital	Eight-item Measure of Workplace Social Capital; General Health Questionnaire (GHQ-12); 0–100 Visual Analogue Scale (VAS) on self-rated health
Vagharseyyedin et al. (2018) [35] (Iran)	Cross-sectional survey	250	Workplace social capital could predict affective organizational commitment ($B = 0.2$, $p < 0.05$)	Eight-item Measure of Workplace Social Capital; Allen and Meyer's Affective Commitment Scale (ACS)
Shin and Lee (2017) [36] (South Korea)	Cross-sectional survey	432	Social capital was a predictor of evidence-based practice (EBP) adoption ($F = 4.393$ – 55.003 ; $p = 0.001$ or < 0.001 for different dimensions)	Social Capital of Nursing (SCON); Developing Evidence-Based Practice Questionnaire (DEBPQ)
Van Bogaert et al. (2017) [37] (Belgium)	Mixed methods (explanatory sequential)	751 in the quantitative survey part; 19 in the qualitative stage	Social capital inversely impacted feelings of emotional exhaustion (path coefficient = -0.18 , $p < 0.05$) and positively impacted feelings of vigor (path coefficient = 0.23 , $p < 0.05$); associations were supported by qualitative findings	Social Capital in Organizations; Maslach Burnout Inventory; Utrecht Work Engagement Scale
Shin and Lee (2016) [38] (South Korea)	Cross-sectional survey	432	Social capital was a positive predictor of job satisfaction ($R^2 = 0.501$, $p < 0.001$) and quality of care ($R^2 = 0.244$, $p < 0.001$)	Social Capital of Nursing (SCON); three questions developed by Sheingold and Sheingold on job satisfaction; Service Quality (SERVQUAL)

TABLE 1: Continued.

Reference	Design	Sample size	Main findings (statistically significant outcomes of nurses' workplace social capital)	Instruments for the main findings
Farahbod et al. (2015) [39] (Iran)	Cross-sectional survey	214	There was an inverse association between social capital and burnout ($r = -0.451$, $p < 0.0001$); social capital could predict burnout ($\beta = -0.34$)	Social Capital Questionnaire devised by Boyas and colleagues; Maslach Burnout Inventory
Read and Laschinger (2015) [40] (Canada)	Longitudinal survey	191	Relational social capital had a negative direct effect on mental health symptoms ($\beta = -0.21$, $p < 0.05$) and a positive direct effect on job satisfaction ($\beta = 0.50$, $p < 0.05$)	Community Subscale of Areas of Worklife Scale (AWS); Mental Health Inventory (MHI-5); items from Shaver and Lacey's scale on job satisfaction
Laschinger et al. (2014) [41] (Canada)	Cross-sectional survey	525	Social capital had direct effects on unit effectiveness ($\beta = 0.29$, $p < 0.05$) and quality of care ($\beta = 0.21$, $p < 0.05$)	Items from Shortell Organizational Culture Scale (social capital and unit effectiveness); a single item developed in the Magnet hospital studies (quality of care)
Van Bogaert et al. (2014) [16] (Belgium)	Cross-sectional survey	1,108	Social capital was related to job satisfaction (OR = 2.19; 95% CI = 1.39, 3.45), (no) intention to leave (OR = 2.07, 95% CI = 1.36, 3.16), quality of care (OR = 1.3, 1.8, 95% CI = 7.85, 22.92), and medication errors (OR = 0.61, 95% CI = 0.43, 0.86)	Social Capital in Organizations; self-developed measures on job outcome (job satisfaction and intention to leave), quality of care, and adverse patient events (medication errors)
Van Bogaert et al. (2014) [42] (Belgium)	Cross-sectional survey	1,201	Social capital had a statistically significant effect on vigor in the improved structural equation model (path coefficient = 0.24)	Social Capital in Organizations; Utrecht Work Engagement Scale
Sheingold and Sheingold (2013) [43] (USA)	Mixed methods (instrument development and test)	Focus groups with 80 nurses for item generation; 325 in the quantitative test stage	Social capital had positive impacts on job satisfaction ($R^2 = 0.557$, $p = 0.000$) and intention to stay ($R^2 = 0.345$, $p = 0.000$) A direct path was accepted between social capital and emotional exhaustion in the improved structural equation model (path coefficient = -0.16 , $p < 0.05$)	Social Capital of Nursing (SCON); self-developed measures on job satisfaction and intention to stay
Van Bogaert et al. (2013) [44] (Belgium)	Cross-sectional survey	1,201	Trust ($\beta = 0.220$, $p < 0.01$) and shared vision ($\beta = 0.184$, $p < 0.05$) of social capital directly affected knowledge sharing; shared vision had a significant effect on patient safety ($\beta = 0.195$, $p < 0.05$)	Social Capital in Organizations; Maslach Burnout Inventory
Chang et al. (2012) [45] (Taiwan)	Cross-sectional survey	797	Social capital (social interaction ($\beta = 0.13$, $p < 0.05$), trust ($\beta = 0.27$, $p < 0.01$), and shared vision ($\beta = 0.34$, $p < 0.001$)) positively impacted organizational commitment	Items from three valid scales (social capital); items adapted from van den Hooff and van Weenen on knowledge sharing; indicators proposed by JCAHO on patient safety
Hsu et al. (2011) [46] (Taiwan)	Cross-sectional survey	797		Measures adapted from several valid instruments

TABLE 1: Continued.

Reference	Design	Sample size	Main findings (statistically significant outcomes of nurses' workplace social capital)	Instruments for the main findings
Kowalski et al. (2010) [47] (Germany)	Cross-sectional survey	959	Social capital was negatively associated with emotional exhaustion (OR = 0.549, 95% CI = 0.403, 0.746)	Social Capital in Organizations; Maslach Burnout Inventory
Ernstmann et al. (2009) [48] (Germany)	Cross-sectional survey	959	Higher social capital was associated with better clinical risk management behavior in the hospital (intercorrelation coefficient = 0.472, $p = 0.01$)	Social Capital in Organizations; Risk Management Questionnaire

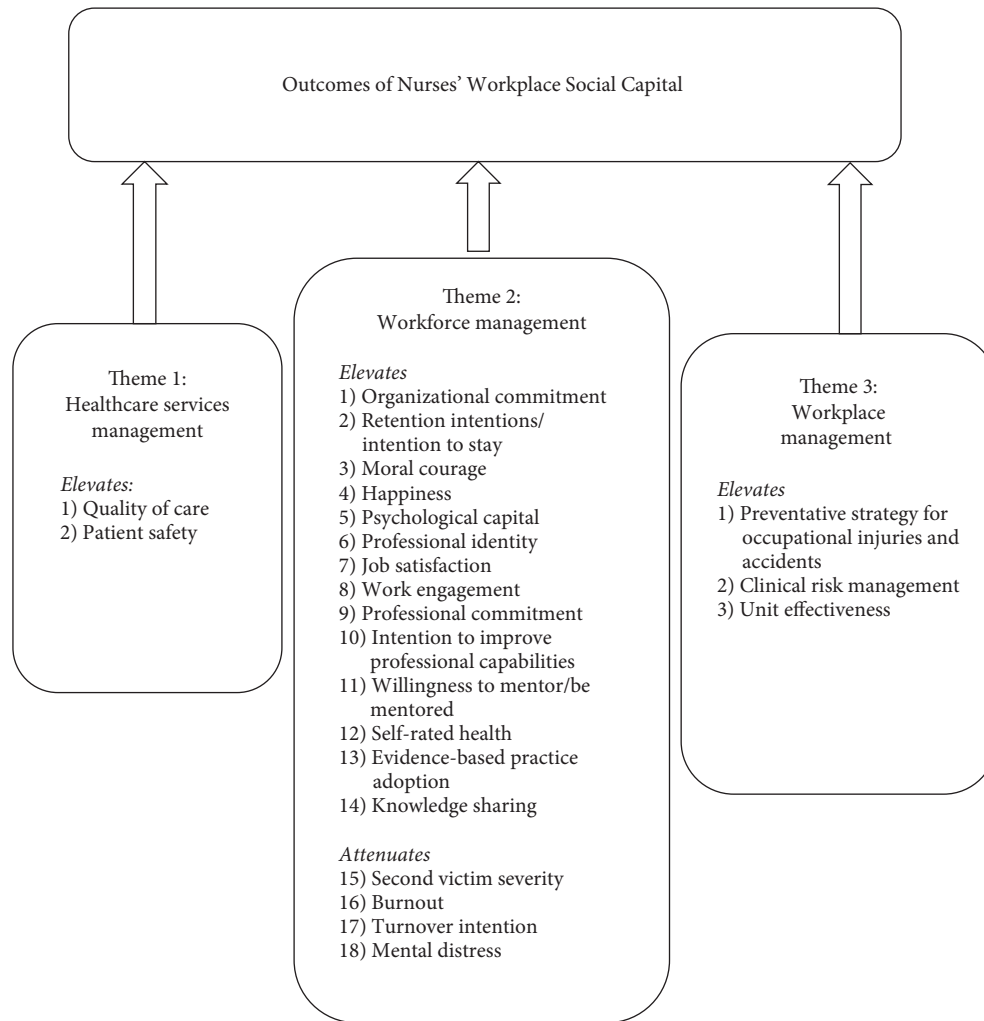


FIGURE 2: Emergence of three themes: healthcare services management, workforce management, and workplace management. Twenty-three statistically significant outcomes of nurses' workplace social capital reported by the 29 studies were grouped into three themes according to their characteristics and contributions.

Ernstmann and colleagues were the first to empirically assess the association between nurses' workplace social capital and clinical risk management in hospitals [48]. Subsequently, a total of 28 other studies were implemented in different settings to assess the empirical association between nurses' workplace social capital and various positive outcomes in healthcare settings [16, 21–47].

Of the 29 selected studies, 24 were quantitative, two were qualitative, and the designs of the remaining three were mixed methods. The majority of the quantitative studies ($n = 23$) had a cross-sectional survey design. Only one study was designed as a longitudinal survey in which the investigators followed up newly employed nurses for one year to assess the impact of social capital on their job satisfaction and their mental health [40].

One of the two qualitative studies aimed to assess the value of nurses' workplace social capital in preventing occupational injuries and accidents in hospital settings [28]; while the second study was conducted among nurses who participated in management initiative training by the English National Health Service Trust [22]. Findings from the

study asserted the positive influence of social capital networks and networking on nurses' retention intentions [22]. Finally, the result of our literature search yielded three mixed-methods studies. One was conducted among nurses in two university hospitals; the investigators explored the associations among several work-related variables and reported that emotional exhaustion, one dimension of burnout, was considerably reduced because of the workplace social capital; meanwhile, vigor, one dimension of work engagement, was increased [37]. The other two studies were implemented with the objective of developing and testing instruments to assess nurses' workplace social capital in different work environments with different workplace cultural norms and values [29, 43].

3.2. Outcomes of Nurses' Workplace Social Capital. We identified a total of 23 outcomes of nurses' workplace social capital. These outcomes were compared and inductively synthesized into three themes (Figure 2): healthcare services management (Theme 1), workforce management (Theme 2),

TABLE 2: Influence of nurses' workplace social capital on the sustainable development goals (SDGs).

Outcomes of nurses' workplace social capital	Number of outcomes	Themes	Main influence on the SDGs
Quality of care [16, 26, 38, 41] Patient safety [16, 45] Happiness [23] Self-rated health [34]	2	Theme 1	SDG 3: good health and well-being
Mental distress* [34, 40] Second victim severity* [24] Burnout* [26, 37, 39, 44, 47]	5	Theme 2	
Preventative strategy for occupational injuries and accidents [28] Clinical risk management [33, 48] Unit effectiveness [41]	3	Theme 3	
Organizational commitment [21, 35, 46] Professional commitment [30] Retention intentions/intention to stay [16, 22, 43] Turnover intention* [29] Moral courage [23] Psychological capital [24] Professional identity [25]	11	Theme 2	SDG 8: decent work and economic growth
Job satisfaction [16, 27, 38, 40, 43] Work engagement [29, 37, 42] Intention to improve professional capabilities [31] Evidence-based practice adoption [36] Willingness to mentor/be mentored [32]	2	Theme 2	SDG17: partnerships for the goals
Knowledge sharing [45] Total	23		

Note: Theme 1: healthcare services management; Theme 2: workforce management; Theme 3: workplace management. *Nurses' workplace social capital attenuates the level of mental distress, second victim severity, burnout, and turnover intention.

and workplace management (Theme 3). Of the 23 identified outcomes, 18 were grouped under the theme of workforce management. We grouped quality of care and patient safety under the theme of healthcare services management. Finally, the theme of workplace management was summarized based on the three following outcomes: a preventative strategy for occupational injuries and accidents, clinical risk management, and unit effectiveness. It is notable that all the 23 outcomes were positive as reported in the selected empirical studies.

3.3. Nurses' Workplace Social Capital and the SDGs. Of all the 29 studies that were reviewed by the authors, none had directly assessed and described the association between nurses' workplace social capital and the SDGs. However, the implicit influence of nurses' workplace social capital on the SDGs was reported and discussed in these 29 studies. The implicit influence of nurses' workplace social capital was mostly reverberated on SDGs 3, 8, and 17 based on connections between its outcomes and SDGs (Table 2).

3.3.1. Influence on Good Health and Well-Being (SDG 3). Nurses are the critical contributors to attainment of SDG 3 [49, 50]. Quality of care and patient safety, which are the outcomes of nurses' workplace social capital (Theme 1) [16, 26, 38, 41, 45], are tightly linked to patients' good health and well-being. For instance, Van Bogaert et al. [16] reported that nurses' workplace social capital improves patients' safety through reduction in medication errors and improves the overall quality of care delivered to patients.

The five outcomes that are clustered under workforce management (Theme 2) demonstrate the influence of workplace social capital on health status of nurses, who are the backbone of provision of healthcare services. According to the findings by Middleton et al. [34], nurses with perception of low level of workplace social capital are at a higher risk for mental distress and compromised health status. The direct protective effect of workplace social capital on nurses' mental health was also reported by Read and Laschinger [40].

Burnout is a complex syndrome with multiple signs and symptoms. Improvement of nurses' workplace social capital is associated with feelings of increased personal accomplishment and decreased emotional exhaustion and depersonalization [26, 37, 39, 44, 47]. Diminished personal accomplishment, emotional exhaustion, and depersonalization have been cited as the core elements of burnout and the main cause of psychological and physical distress among nurses [26, 37, 39, 44, 47].

Self-perception of happiness is an important element for an individual's health and well-being. Pirdelkhosh et al. [23] reported that workplace social capital can be a positive facilitator of nurses' happiness in hospital settings during the stressful period such as COVID-19. The importance of strengthening nurses' workplace social capital in mitigating the possibilities of experiencing the second victimization, in case of an unanticipated adverse patient event, also has been documented [24].

Finally, the three outcomes of nurses' workplace social capital, a preventative strategy for occupational injuries and

accidents at work, clinical risk management, and unit effectiveness, are classified under the theme of workplace management (Theme 3). These three outcomes are also in a close association with SDG 3 (good health and well-being). Social capital, in the form of social support, is instrumental in prevention of occupational injuries and accidents among nurses [28]. Nurses who possess a higher workplace social capital, in general, are more effective and perform more efficiently in managing clinical risk behaviors [33, 48]. Furthermore, unit work effectiveness in hospitals as perceived by nurses is also tightly linked to the positive effects of workplace social capital [41]. These outcomes of nurses' workplace social capital contribute to developing, implementing, and sustaining policies and procedures for a safe and constructive healthcare environment for patients and professionals. A constructive healthcare environment improves the overall health and permits good health and well-being for all (SDG 3).

3.3.2. Influence on Decent Work and Economic Growth (SDG 8). A total of 11 outcomes of nurses' workplace social capital under the theme of workforce management (Theme 2) are closely related to SDG 8 (Table 2). Investments in healthcare employment and the healthcare industry can improve economic productivity and economic growth [51]. Nurses are the backbone of delivery of healthcare services and the largest workforce in the healthcare industry. Unfortunately, in recent years the nursing profession has been grappling with the exodus of nurses from the field [52]. We identified a range of outcomes of nurses' workplace social capital (Theme 2) as the contributing factors in reducing, if not preventing, exodus and/or high turnover of nurses. Sheingold and Sheingold [43] and Van Bogaert et al. [16] reported that workplace social capital could increase nurses' intention to stay (no intention to leave). Fisher et al. [22] reported that social capital networks and networking at the workplace are positive factors that can influence nurses' retention intentions. Also, Norikoshi et al. [29] reported the protective effect of nurses' workplace social capital in ameliorating turnover intention. Job satisfaction is an important variable that can influence turnover and possibly could prevent the exodus of nurses from the field. Nurses' workplace social capital has been reported as a positive influencer of job satisfaction in several studies [16, 27, 38, 40, 43].

Other factors such as personal values and beliefs of the workforce can also influence the perception of work dignity and decent work. For example, personal commitment to the profession and organization of nursing, psychological capital, work engagement, willingness to adopt evidence-based nursing practice, and intention to improve self-professional capabilities (Theme 2) are important influencers of perception about work dignity and decent work at personal level [21, 24, 29–31, 35–37, 42, 46]. The value of workplace social capital is particularly noticed during crises such as the COVID-19 pandemic. Nurses who had a positive perception about their workplace social capital were able to demonstrate stronger moral courage and professional identity [23, 25].

3.3.3. Influence on Partnerships for the Goals (SDG 17). This goal emphasizes developing innovative strategies for collaboration and cooperation at every level of work settings. Partnership is one of the core pillars of sustainable development and should be initiated at the base of this pillar which is the workplace. We identified two outcomes of nurses' workplace social capital (Theme 2) that are closely related to SDG 17. Trust is the fulcrum for an effective partnership and the tenet of nurses' workplace social capital. Chang et al. [45] documented that nurses who have stronger trust in their workplace are more likely to share their knowledge and tangible and intangible resources with each other. Nurses' workplace social capital also influences effectiveness in dissemination of information and cooperative learning. Pham et al. [32] reported that willingness to mentor and to be mentored increases with constructive workplace social capital network. Nurses' workplace social capital can be perceived as a factor influencing partnerships for the goals (SDG 17).

4. Discussion

Nurses by virtue of their professional responsibilities have positive influence in achieving the SDGs of the UN. The precursors to the SDGs can be traced back to Florence Nightingale's remarkable contributions to global health more than a century ago [53]. Nevertheless, nurses may either underestimate and/or misconstrue the strength of their professional power in contributing to the SDGs [7, 49]. Professionally tailored discussions and education are essential in awakening and empowering nurses to assume responsibilities either at the individual level or collectively in the global movement for sustainable development [49, 54, 55].

We conducted this integrative review based on empirical research evidence to address the association between nurses' workplace social capital and the SDGs. We identified 23 outcomes of nurses' workplace social capital which we classified under three themes and have demonstrated their connections and contributions to the goals 3, 8, and 17 of sustainable development (Figure 2 and Table 2).

The core objective of the nursing profession is to promote health for all people, including nurses themselves, at every age and in any setting [6]. Workplace social capital promotes constructive and respectful relational networks between nurses and the other healthcare professionals [11, 15, 56]. These positive interactions reduce the risks of errors in the delivery of healthcare services, improve the practice of shared decision-making in diagnostic and treatment process, and improve the overall quality of care. Furthermore, respectful and trustworthy interactions among nurses and with the other healthcare professionals improve efficiency and effectiveness of the delivery of healthcare services and facilitate constructive clinical management. Ultimately, patients and healthcare providers can benefit from a safer healthcare environment, healthy lives, and overall well-being which are the main objectives of SDG 3 [4].

The high rate of nursing turnover and nursing shortage is a global issue that can have severe economic consequences [57]. For example, the annual economic loss of one percentage increase in nursing turnover rate has been estimated at an average of additional \$380,600 per annum for a hospital [58]. In a recent publication, Gilbert discussed the importance of nursing workplace social capital in closing the gap of nursing shortage [12]. Nurses' workplace social capital promotes a supportive and trustworthy work environment which promotes dignity and stability of the workforce and therefore contributes to SDG 8 (decent work and economic growth).

Since the time of Florence Nightingale, nurses have been acting as catalysts in diplomatic, political, and combat arenas, although mostly in marginal positions, to strengthen constructive international partnerships and to reduce human suffering [59]. Establishment of partnerships and cooperation at all levels, SDG 17, is based on mutual trust and leadership. Strengthening nurses' confidence in assuming leadership positions at the national and international levels requires involvement in policy decision-making processes [6, 49]. We argue that nurses' workplace social capital can assist with strengthening of nurses' confidence in seeking leadership positions and diplomatic decision-making processes. However, findings from our present study lack adequate data to support our statement. Future research should shed light on the potential positive effects of nurses' workplace social capital on nurses' confidence in assuming leadership spots and international diplomatic relationship positions.

Finally, we believe nurses' workplace social capital contributes to gender equality (SDG 5). Despite our extensive search, we were not able to identify empirical evidence to support the association between nurses' workplace social capital and gender equality. Nurses despite their long history and contributions to patient care and clinical services, in general, are perceived and treated as "second-class citizens" in the healthcare industry [60, 61]. Women make up 70% of the healthcare professionals across the globe. Yet, they occupy only 25% of all leadership positions. Furthermore, they are paid less than their male counterparts holding similar positions [62]. Meanwhile, gender equality extends beyond women's suffrage and equal pay at work. Nursing historically has been a female-dominant profession; however, since the turn of 21st century more men have been opting to enter this field, despite the implicit cultural stigma [63]. We set forth that the attribute of social cohesion of the nurses' workplace social capital can be a conduit for gender equality. Social cohesion is defined as a resource for generating group unity in nourishing a sense of community among people with diverse backgrounds [14]. We voice that the concept of diverse backgrounds does not preclude gender identity. To our knowledge, presently no research has been published to address the association between nurses' workplace social capital and gender diversity in the nursing profession.

4.1. Limitations. Some limitations exist in our integrative review. First, we focused on empirical evidence published in peer-reviewed journals that might not be able to fully demonstrate the contribution of nurses' workplace social capital to the SDGs. Theoretical evidence and other potential resources (e.g., book chapters and grey literature) should be considered in future work. Second, most of the quantitative studies in the literature were conducted with a cross-sectional design. Studies with more robust designs, e.g., longitudinal or interventional, would be beneficial to strengthen our findings. Qualitative studies exploring the benefits of nurses' workplace social capital should be encouraged as we were able to identify only two qualitative studies. Moreover, studies directly addressing the relationships between nurses' workplace social capital and sustainability are suggested. Finally, we only searched articles published in the English language. Evidence published in other languages potentially was missed. Despite these limitations, our integrative review is the first to address the contributions of nurses' workplace social capital to the 17 SDGs of the UN in response to calls for contextualizing and promoting sustainable development. Findings of our integrative review innovatively raise a picture of and clarify dedications of the nurses to a sustainable, peaceful, and healthy world.

5. Conclusion

We have conducted an integrative review following the methodology by Whitemore and Knafel [17]. A range of outcomes of nurses' workplace social capital were identified from the empirical evidence and three themes were abstracted. Findings of our review shed light on the significant role of nurses' workplace social capital in attaining three of the SDGs, good health and well-being (SDG 3), decent work and economic growth (SDG 8), and partnerships for the goals (SDG 17). Empirical evidence on the other SDGs, e.g., gender equality (SDG 5), should be explored in future studies. Nurses' depth of knowledge and appreciation of their contributions to the SDGs should be encouraged and facilitated. Our work is the first step in connecting and integrating nurses' workplace social capital to the SDGs in academic context and curriculum. This effort helps nurses to understand their roles and responsibilities in sustainable development in their daily work and is beneficial to the development of nurses' workplace social capital.

6. Implication for Nursing Management

Nurses' workplace social capital has become an important concept in the academic domain of nursing management due to its favorable outcomes related to healthcare provisions, workforce, and healthcare organizations. We have made efforts to connect these outcomes to the SDGs. The campaign of sustainable development has offered nurses opportunities to raise their voice at the policy tables; nurses

are considered the backbone of healthcare services which is connected to every and all the 17 SDGs. Concrete plans and methodologies that tailor these broad goals to nursing daily work and nursing management are paramount of importance in elevating the role and responsibilities of the nursing professionals. Our work promotes and accelerates this crucial process from a management perspective of nurses' workplace social capital. Education is crucial for integrating nurses into active engagement with the SDGs [49, 50]. The relatively high prevalence of disconnection between the role and responsibilities of nurses and the SDGs among nurses calls for constructive educational interventions. Our findings can be used as educational and management resources in clinical and curricula formulation in academic nursing. Importantly, investments and research on nurses' workplace social capital can be greatly strengthened by connecting and revealing its contributions to the UN universal goals of sustainable development.

Data Availability

Supporting data for this study are included within the article and its supplementary tables.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Jia-Min Xu and Ming-Guo Cao contributed to the conceptualization, methodology, data curation, original drafting, and review and editing of the manuscript. Azadeh Stark contributed to conceptualization, methodology, and review and editing of the manuscript. Qian-Cheng Gao and Yi-Xuan Lu contributed to methodology and data curation.

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Supplementary Materials

Supplementary Table 1: Search strategies. Supplementary Table 2: Quality assessment of the included articles. (*Supplementary Materials*)

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Review Article

Nursing Professionalism: A Scoping Review of Implementation Level, Evaluation Instruments, Influential Factors, and Intervention Strategies

Jing Jiang,¹ Mengyuan Liu,¹ Yinglan Li,² Hongmei Gao ², and Lingyun Tian ³

¹Xiangya School of Nursing, Central South University, Changsha, China

²Teaching and Research Section of Clinical Nursing, National Clinical Research Center of Geriatric Disorder, Xiangya Hospital of Central South University, Changsha, China

³Department of Nursing, the First Affiliated Hospital of USTC, Division of Life Sciences and Medicine, University of Science and Technology of China, Hefei, China

Correspondence should be addressed to Hongmei Gao; 616811482@qq.com and Lingyun Tian; 464200541@qq.com

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Aim. The objective of this study is to provide a comprehensive analysis and synthesis of pertinent research on the subject of nursing professionalism. **Background.** The number of studies documenting nursing professionalism has been consistently increasing over the years; however, a comprehensive synthesis and analysis of the evidence presented in these reports is currently lacking. **Evaluation.** The scope reviews were conducted using electronic databases including PubMed, Web of Science, Cochrane Library, Embase, Chinese National Knowledge Infrastructure (CNKI), Chinese Science and Technology Periodical Database (VIP), and Wanfang database. **Key Issues.** This review included 15 studies and identified 4 significant pertinent issues: (1) the need for further investigation into the implementation level of nursing professionalism; (2) the development of culturally sensitive instruments to assess nursing professionalism; (3) an in-depth exploration of the associated factors influencing nursing professionalism; and (4) the critical implementation of diverse intervention strategies to enhance nursing professionalism. **Conclusions.** This review presents a comprehensive overview of the implementation level, assessment tools, influential factors, and intervention strategies in nursing professionalism research. In addition, it emphasizes the future research direction in this field. **Implications for Nursing Management.** Nursing administrators need to understand the significance of improving the professional education and training of nurses, fostering a conducive work environment, and providing support for their active development of professional skills and nursing professionalism. These factors collectively contribute to the long-term professional development of nurses and enhance the quality of patient care.

1. Introduction

Nursing professionalism serves as a guiding principle for nurses, ensuring patient safety and the delivery of high-quality nursing care. It underscores the significance of societal service, deeply rooted in the essence of humanity, thereby conferring a distinct meaning to nursing professionalism. Jiang et al. [1] believed that nursing professionalism encompasses the integration of fundamental practical concepts, value orientation, professional personality, professional standards, and professional style exhibited

by nurses in their interactions with patients, which is a reflection of the nurses' attitudes and behaviors toward nursing work. Hafferty [2] concluded that professional competence, self-regulation, honor and integrity, altruism, respect, teamwork, responsibility, and continuous learning constitute the fundamental components of nursing professionalism. Miller [3] employed the prevalent professional perspectives of sociologists and nursing managers to develop the model of the wheel of professionalism in nursing based on ethical principles articulated in the American Nurses Association's (ANA) Code of Ethics for nurses policy

statement. In the context of education in a university setting and scientific background in nursing, the model defines the professional spirit from the behavioral perspective, which includes (1) continuing education and competency; (2) adherence to the code for nurses; (3) professional organization participation; (4) publication and communication; (5) self-regulation and autonomy; (6) community service orientation; (7) theory: development, use, and evaluation; and (8) research: development, use, and evaluation. The term *nursing professionalism* refers to the fundamental professional ideas, attitudes, and values that nurses demonstrate in their nursing practice [4, 5], which includes the service concept of “*patient-centered*,” the professional attitude of “*patient interests above all*,” and the values of “*promoting the physical and mental health of patients*.”

Nursing professionalism plays an important guiding role in the nursing profession. It highlights ethical principles, beliefs, and life perspectives and also represents the moral development, civilization, and spiritual attitude of nurses [6]. Nursing professionalism exerts a positive impact on elevating nursing standards, enhancing job satisfaction, promoting the sustained choice of the nursing profession, and mitigating the turnover rate among the nursing staff [7–11]. The cultivation and perpetuation of nursing professionalism are imperative for the development of exceptional nurses. The establishment of a truly exemplary nursing profession necessitates comprehensive legislation, a compassionate social environment, and most importantly, collaborative efforts from healthcare practitioners, educators, and administrators [12].

Studies on the implementation level of the nursing professionalism in clinical practice have been extensively conducted in various countries and regions. However, there is currently a dearth of empirical evidence exploring the nursing professionalism instruments in various cultural contexts, the associated influential factors, and the diversified intervention strategies. In this review, the assessment tools, influential factors, and intervention strategies of nursing professionalism were systematically evaluated based on the reporting framework for scope review proposed by Arksey and O’Malley in 2005 [13]. This comprehensive assessment aims to provide a reference for future studies.

2. Methods

2.1. Refining the Research Inquiry. To ensure the smoothness of this scoping review, the research questions were developed as follows:

- (1) What is the implementation level of nursing professionalism in clinical practice?
- (2) What assessment tools are available for the evaluation of nursing professionalism?
- (3) What are the key factors that influence nursing professionalism?
- (4) What effective interventions can be implemented to enhance nursing professionalism?

2.2. Identifying Pertinent Studies. The literature for this review was obtained by conducting comprehensive searches in seven electronic databases, including PubMed, Web of Science, Cochrane Library, Embase, CNKI, VIP, and Wanfang. These databases were searched from their inception until 13 July 2023. A combination of subject terms and free words was used to ascertain the topic of all relevant research, and the Boolean operators *OR* and *AND* were utilized to amalgamate the outcomes. The search theme was as follows: (a) *Professional spirit, Professionalism medical professionalism, Professionalism education, Occupational spirit, and Vocational spirit* and (b) *Nurses, nursing, Nursing students, Nursing personnel, Registered nurses, and Pupil nurses*. The specific strategies for retrieving data from the database can be found in Supplemental File 1.

2.3. Selecting Relevant Studies. The studies included in this review met the following criteria: (a) they were written in English or Chinese; (b) the subjects of the study were nurses or nursing students; and (c) they included the implementation level of nursing professionalism, instruments for measuring nursing professionalism, associated influential factors, or intervention strategies. Studies were excluded if (a) full text was not accessible; (b) their results had been duplicated in another article; and (c) they belonged to categories such as reviews, general comments, editorials, or case reports.

A total of 4,387 studies (Figure 1) were identified and imported into the NoteExpress software. After removing duplicates, 3,184 studies remained. These studies were further evaluated based on their titles and abstracts to determine their compliance with the inclusion and exclusion criteria. Subsequently, 3,015 studies that did not meet the inclusion criteria were excluded, and the remaining 169 full-text studies were retrieved and independently assessed by two co-first authors. Following a meticulous examination of the inclusion and exclusion criteria, 15 studies were finally included in this review.

2.4. Data Extraction. Two researchers independently extracted data using a designated data extraction form, under the close supervision of another researcher. The extracted information encompassed details such as authorship, publication year, country of origin, subjects, study design, implementation level of nursing professionalism, assessment tools, influential factors, intervention strategies, and intervention duration.

3. Results

3.1. Description of Studies. A total of 15 papers were published between 2014 and 2023. The majority of studies originated from China ($n = 8$), and the remaining papers were contributed by Japan ($n = 3$), Korea ($n = 2$), India, and Czechoslovakia ($n = 1$ each). The content of the study included the implementation level ($n = 8$), assessment tools ($n = 14$), the influential factors ($n = 12$), and the intervention strategies ($n = 3$). The study design encompassed a range of methodologies, including cross-sectional studies ($n = 9$), quasi-experimental

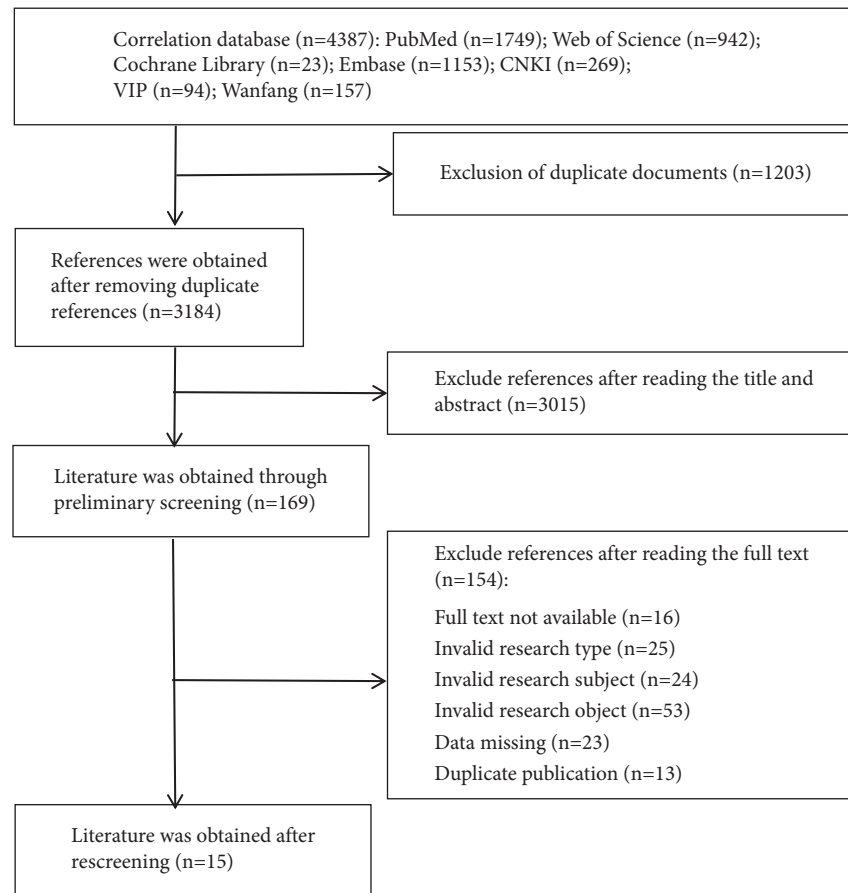


FIGURE 1: Flowchart of literature screening.

studies ($n = 1$), randomized controlled trials ($n = 2$), qualitative studies ($n = 1$), and mixed studies ($n = 2$). The subjects consisted of both nurses ($n = 10$) and nursing students ($n = 5$). Table 1 shows the details of the included studies.

3.2. Implementation Level of Nursing Professionalism Level. Among the 15 studies included, 8 papers discussed the implementation level of nursing professionalism in clinical practice in different regions. The existing research conducted in China indicates that undergraduate nursing students possess a moderate level of nursing professionalism [5, 22]. A separate study by Ma et al. [17] reveals a prevalent decline in the perception of nursing professionalism among low-income nurses. The nursing professionalism among the surveyed nurses from seven Chinese third-class A general hospital nurses was marginally lower than that of Korean-American nurses and similar to the average level in the United States [18]. Kuručová [20] conducted a survey on Czechoslovakian nurses with a moderate level of nursing professionalism, while Tanaka et al. [25] found a poor level of nursing professionalism among Japanese nurses.

3.3. Assessment Tools of Nursing Professionalism. Among the 15 publications, a total of 7 assessment tools were examined. Table 2 shows detailed information of the assessment tools of nursing professionalism. Currently, the commonly used

assessment tools have a number of limitations. The Chinese version of Hall's Professionalism Inventory (HPI) [22] exhibits robust reliability, effectiveness, and cultural sensitivity. However, stratified random sampling of various populations is still required to further corroborate the results of the confirmatory factor analysis and further refine the sampling technique used in the exploratory factor analysis of the scale. Based on a theoretical model, the Behavioral Inventory for Professionalism in Nursing (BIPN) (Miller, 1985) exhibits good reliability and validity. Nevertheless, its general applicability needs to be confirmed considering cultural variations. The Nurses' Professionalism Inventory (NPI) [24] is a reliable tool with a high degree of fit for each of its factors, while it lacks validity testing and does not adhere to any specific theoretical model during its development process, and the Korean-Nursing Profession Value (KNPV) [27] has the same problem. The self-designed questionnaire [17] has gathered concentrated expert consultation opinions on indicators at all levels. These experts possess high motivation and authority, ensuring the questionnaire's scientific rigor. However, it is imperative to further consider the completeness of index construction due to insufficient letters consulted with experts. The Nurse Professionalism Scale (NPS) (Gyung, 2022) demonstrates reliability and a rigorous design, but it suffers from a limited sample size and lacks a large multicenter survey. Despite demonstrating excellent internal consistency and stability,

TABLE 1: Characteristics of the included studies ($n = 15$).

Author (year)	Country	Subjects	Study design	Implementation level (score)	Evaluation instruments	Influencing factors	Intervention strategies (intervention duration)
Zhang et al. [5]	China	Nursing students	Cross-sectional	Medium (69.83 ± 9.01)	Hall's professionalism inventory (Chinese version)	Gender; reasons for applying; willingness and recognition of nursing; role model	— (—)
Xue et al. [14]	China	Nursing students	Randomized controlled trials	—	Hall's professionalism inventory (Chinese version)	—	Control group: diary writing; Experimental group: narrative medicine and narrative writing theory courses (12 months)
Sun et al. [15]	China	Nursing students	Randomized controlled trials	—	Hall's professionalism inventory (Chinese version)	—	Control group: conventional nursing education, including courses in nursing humanities, nursing psychology, nurse skills training and basic nurses Courses; Experimental group: an additional health communication education course on the basis of conventional care education (3 months)
Dong and Shao [16]	China	Nurses	Quasi-experimental	—	Hall's professionalism inventory (Chinese version)	—	Control group: newly enrolled nurses receive one-on-one class-based training once a week, which includes intensive instruction on hospital systems, theoretical knowledge of the operating room, and operational skills; Experimental group: standardized training in penguin culture (including a professional tutor responsible for imparting knowledge to newly enrolled nurses, a mentor responsible for cultivating the desired attitude among these nurses, a training partner responsible for skills training, and a supervisor responsible for the supervision of the curriculum development and teaching methodologies) (12 months)

TABLE 1: Continued.

Author (year)	Country	Subjects	Study design	Implementation level (score)	Evaluation instruments	Influencing factors	Intervention strategies (intervention duration)
Ma et al. [17]	China	Nurses	Cross-sectional	Low (—)	Self-designed questionnaire	Personal factors; hospital factors; social factors	— (—)
Yu et al. [18]	China	Nurses	Cross-sectional	Low (83.41 ± 8.75)	Hall's professionalism inventory (Chinese version)	Gender; whether the first choice of college entrance examination is nursing major; first education; employment form; receipt of nursing-related rewards for the last 3 years	— (—)
Gyung [19]	Korea	Nursing students	Cross-sectional	—	Nursing professionalism scale	Critical thinking; leadership	— (—)
Kurucová et al. [20]	Czechoslovakia	Nurses	Cross-sectional	Medium (136.74 ± 32.66)	Nurses' professionalism inventory	Professional ranks and titles; education background	— (—)
Pareek and Batra [21]	India	Nurses	Qualitative	—	Focus interview group	Personal factors; organizational factors; environmental factors	— (—)
Wu et al. [22]	China	Nursing students	Cross-sectional	Medium (67.76 ± 6.40)	Hall's professionalism inventory (Chinese version)	Humanitarian care Capacity; social support	— (—)
Zhao et al. [23]	China	Nurses	Mixed	—	Nurse professionalism questionnaire	Gender; professional ranks and titles; education background; work years	— (—)
Ichikaw et al. [24]	Japan	Nurses	Mixed	—	Nurses' professionalism inventory	Beliefs and attitudes on the basis of professional behavior in nurses	— (—)
Tanaka et al. [25]	Japan	Nurses	Cross-sectional	Low (6.74 ± 3.89)	Behavioral inventory for professionalism in nursing	Education background; work years; whether the current nursing manager	— (—)
Tanaka et al. [26]	Japan	Nurses	Cross-sectional	Low (9.19 ± 3.89)	Behavioral inventory for professionalism in nursing	Nursing experience; education preparation; the current position as a nurse administrator	— (—)
Kim and Park [27]	Korea	Nurses	Cross-sectional	Medium (96.64 ± 13.48)	Korean-nursing professional value	Self-efficacy; job embeddedness	— (—)

Note. — means "none."

TABLE 2: Assessment tools of nursing professionalism ($n = 7$).

Evaluation instruments	Country	Author (year)	Scoring system	Dimension number/dimension name	Number of items	Reliability and validity
Hall's professionalism inventory (Chinese version)	China	Wu [28]	Likert 5	6/participation in group organization; public service concept; professional autonomy; self-discipline; sense of professional mission; work satisfaction	25	Cronbach's α 0.750; test-retest reliability 0.840;
Behavioral inventory for professionalism in nursing	American	Miler [3]	—	9/educational preparation; autonomy; theory; code of ethics; community service; competence; publication; research; professional organizations	48	Cronbach's α 0.760;
Nurses' professionalism inventory	Japan	Ichikawa [24]	Likert 6	5/accountability; self-improvement; professional attitudes; nursing professional development; professional members	28	Cronbach's α 0.950; test-retest reliability 0.940;
Self-designed questionnaire	China	Ma [6]	—	4/professional ethics; professional awareness; professional skills; personality characteristics	40	Cronbach's α 0.778;
Nurse professionalism scale	Korea	Gyung [19]	Likert 5	5/professional self-concept; social awareness; nursing professionalism; nursing role and nursing originality	18	Cronbach's α 0.870;
Nurse professionalism questionnaire	China	Zhao [23]	Likert 5	5/unity and cooperation spirit; professional identity; professional development of independent consciousness; spirit of self-determination; dedication	19	Cronbach's α 0.737; content validity 0.859
Korean-nursing professional value	Korea	Yeun et al. [29]	Likert 5	5/professional self-concept; social recognition; nursing expertise; nursing competence; nursing autonomy	29	Cronbach's α 0.920

Note. — means not provided.

the nurse professionalism questionnaire [23] is limited in its research scope and requires careful consideration of its authority.

3.4. Influential Factors of Nursing Professionalism. Among the 15 publications, 10 articles were related to the influential factors of nursing professionalism, mainly including individual and organizational factors. Individual factors include gender, personal abilities, volunteer application, education level, and job position. In the existing studies, researchers have confirmed the effect of these influential factors on nursing professionalism. Specifically, male nurses tend to demonstrate comparatively lower levels of professionalism in comparison to their female counterparts [5, 18, 23]; the level of nursing professionalism is positively associated with critical thinking abilities, self-leadership skills, humanistic care capabilities, and self-efficacy [17, 21, 22, 27]; the level of nursing professionalism of nursing students is significantly elevated when they autonomously select the field [5, 18]; the higher level of education raises the standard for the level of nursing professionalism [5, 18, 23, 26]; in addition, nurses in higher job positions exhibit the higher level of nursing professionalism [20, 26]. Organizational factors such as rules and regulations, decision-making authority, and organizational culture also significantly affect nurses' professionalism [21].

3.5. Intervention Methods for Nursing Professionalism. Intervention studies on nursing professionalism were conducted in 3 out of the 13 articles [14–16]. Intervention methods mainly include narrative medicine education [14], health communication courses [15], and penguin style training [16]. Xue et al. [14] cultivated students' narrative ability through storytelling, careful reading, reflective writing, sharing, and discussions, and confirmed that narrative medicine can enhance students' nursing professionalism after a 12-month intervention study. In addition, the study reaffirmed the significance of empathy and humanistic care. Social media play a pivotal role in health communication courses, and Sun et al. [15] instructed nursing students on the effective utilization of social media platforms while monitoring their progress in developing social media competencies. After a 3-month intervention study, the social media capabilities of nursing students were significantly improved after receiving health communication education, and the utilization of social media platforms exerted a positive impact on the professionalism of nursing students. Dong and Shao [16] proposed the penguin style cultivation method for nursing professionalism. Specifically, a penguin style cultivation teaching group was first established, including nursing professional tutors, mental mentors, supervision tutors, and training partners, and then the penguin style training method was employed. The knowledge training of nurses was entrusted to professional tutors, while the attitude training was overseen by mental tutors. Skill training of nurses was facilitated by training partners, and supervision tutors were assigned the responsibility of overseeing teaching plans and methods,

ultimately leading to a significant enhancement in nurses' professionalism.

4. Discussion

The importance of nursing professionalism lies in its promotion of patient health, maintenance of medical quality and safety, attention to holistic patient needs, the transmission of professional responsibility and values, and enhancement of nurses' career satisfaction. These attributes represent the fundamental qualities and attitudes that nurses must possess [30]. The concept of nursing professionalism should not be limited to a mere professional ethic, but rather as an ethics framework for nursing and even the broader healthcare industry. Therefore, it is essential to provide an overview of current research on nursing professionalism for nursing administrators and to maintain the stability of the nursing team.

In recent years, there has been a growing global interest in nursing professionalism, as evidenced by the findings of this study. Notably, Asian countries have shown particular attention to this aspect, which may be related to the high turnover rate of nurses in these regions [31, 32]. Consequently, research on nursing professionalism is seen as a means to enhance professional identity within the nursing profession.

The future trajectory of nursing professionalism warrants further investigation. Currently, disparities exist in research findings regarding the level of nursing professionalism across different countries and regions. For example, the level of professionalism among nurses in Czechoslovakia is considered moderate [20], whereas the professionalism level among nurses in Japan is comparatively low [25]. This disparity may be attributed to the absence of a unified connotation of nursing professionalism. Connotations are context-specific, and cultural and institutional contexts can influence the definition of connotations [33]. The connotation of nursing professionalism in China primarily focuses on the individual level, encompassing practice concepts, professional attitudes, value pursuits, professional ethics, and professional abilities. In other countries, the connotation of nursing professional spirit is directly implemented at the personal, interpersonal, and public levels [21]. The in-depth analysis of connotations and the clarification of variable indicators can guide further related research, and logical analysis methods should be applied to delineate specific issues [34]. Currently, inadequate breadth and depth of research along with ambiguous definitions of connotations have led to some studies deviating from objective facts. In the future, it is necessary to elucidate the connotations, structural components, and key points, clarify the ambiguous connotation, unify the relevant connotation, and further explore the level of professionalism of nursing. This review serves as a valuable reference for future research, the development of assessment scales, and the formulation of relevant intervention measures and policies in the field of nursing professionalism.

We urgently need to develop a culturally specific assessment tool for nursing professionalism that can be

applied to diverse cultural backgrounds. Accurate measurement of nursing professionalism can assist nursing staff in forming more standardized and unified nursing behaviors [35]. The levels of nursing professionalism vary across different countries and regions, leading to different requirements for measurement instruments and challenges in the coordination of measurement standards and indicators. The limitations and imbalances of measurement instruments also restrict the comprehensiveness of assessment results, leading to one-sided and misleading evaluations [36]. Currently, the nursing professionalism assessment tool developed by Hall and Miler is grounded in a theoretical framework and extensively studies professionalism as a comprehensive concept, with broad applications [37–40]. Moreover, certain researchers focus on specific attributes of nursing professionalism and use corresponding scales as assessment tools [24]. At present, the development process of some research instruments lacks a specific theoretical model; some research instruments have not undergone reliability and validity testing, leading to limited research scope and a lack of multicenter and large-sample investigations. In summary, current assessment tools for nursing professionalism are still imperfect, as they lack clear evaluation effects, robust validity, and specificity. In the future, researchers should develop assessment tools with local characteristics based on the distinctive features of nursing professionalism in diverse regional cultural backgrounds. Furthermore, these tools should prioritize scientific rigor, reliability, and practicality while undergoing rigorous validation and refinement through relevant research studies.

The factors influencing nursing professionalism necessitate further exploration. The results of our scope review indicate that nursing professionalism is influenced by many complex factors. In terms of individual factors, studies mainly focus on gender, personal abilities, and career choice. Previous studies have demonstrated that male nurses tend to exhibit lower overall professionalism scores compared to their female counterparts [5, 18]. In addition, the level of nursing professionalism is positively associated with critical thinking abilities, self-leadership skills, and humanistic care capabilities. In China, due to the disproportionate number of candidates in college entrance examinations, colleges and universities are compelled to reassign unsuccessful candidates from their initial voluntary majors to undersubscribed majors. This process is commonly referred to as transfer. Nursing students who are transferred to the nursing profession have deep-seated psychological resistance to the nursing profession and experience strong emotional discrepancies due to the transfer results, which in turn affect their professionalism [17, 18]. In terms of organizational factors, the sense of responsibility and professionalism of nurse educators can be enhanced through adherence to rules and regulations, delegation of decision-making power to nurses by leaders, and fostering a positive organizational atmosphere [21]. These interventions will facilitate nurses in recognizing their intrinsic value, thereby fostering the cultivation of appropriate professional values. Nursing professionalism is an integral part of professional culture, necessitating comprehensive consideration of social and

psychological factors and cultural traditions in future research. However, nursing professionalism is embedded within the professional culture, and future research should fully consider the influence of organizational managers, social psychological factors, and cultural traditional factors. The current research predominantly relies on cross-sectional surveys, while cross-sectional surveys are limited in their ability to elucidate intricate phenomena, establish causal relationships, and make future predictions. There are few reports on the interaction and causal mechanisms among various influential factors. Therefore, multicenter, large-sample, specific population, and longitudinal studies based on different cultural backgrounds are required to fully explore the factors affecting nursing professionalism.

Diversified interventions play a crucial role in enhancing nursing professionalism. The intervention study on nursing professionalism is still in its developmental stage, and its positive impact has been preliminarily validated, but there is still significant potential for further development and improvement. Currently, interventions aimed at enhancing nursing professionalism mainly include narrative medicine education [14], health communication courses [15], and penguin style training [16]. Specifically, narrative medicine education can be used to facilitate nurses' self-reflection, foster their empathetic abilities [41], and understand patients' real feelings from different perspectives, thus shaping the correct professional values. However, this study adopted voluntary participation and self-report surveys, and the results may be influenced by subjective factors. Furthermore, the absence of long-term evaluation regarding the impact of narrative medicine programs limits the understanding of their potential influence on the development of longitudinal intervention strategies [14]. The role of social media in health communication is increasingly significant, and nursing students demonstrate a high level of engagement with social media platforms [14]. Therefore, the research on health communication courses exhibits good innovation and feasibility. Sun et al. carried out randomized controlled experiments to conduct an intervention using health communication courses, while the blinding experimental design was not used, leading to the reduced reliability of the research results. The concept of penguin style training is derived from the cooperative breeding behavior of emperor penguins in harsh and densely populated environments, serving as a team-oriented pedagogical approach [16]. This training method is particularly applicable to departments and groups characterized by close-knit teamwork, such as operating rooms [16]. In the study conducted by Dong et al., although the efficacy of the penguin style breeding method in improving nursing professionalism has been verified, the limited sample size may have slightly compromised the statistical significance. In addition, quasi-experimental research was employed in their study. The research design of the quasi-experimental study is not rigorous, and there are different degrees of deviations from the allocation of research objects, the implementation of intervention measures, and the measurement of outcome indicators, which reduce the accuracy of the research results. Previous studies have shown that randomized controlled trials are the highest

level of evidence for evaluating the effectiveness of interventions [42]. Therefore, future interventional studies should prioritize standard randomized controlled trials in order to enhance the professionalism of nursing. However, it is worth noting that certain intervention plans lack comprehensive design principles, reference models, or theoretical foundations. Due to the complexity of the concept and the diversity of influential factors, the development of the plans should involve multidisciplinary teams and formulate multilevel, scientifically effective intervention plans [43]. In view of this, the formulation of intervention plans should be based on mature and comprehensive models as theoretical guidance, aiming to develop scientifically rigorous multidisciplinary intervention plans. In the future, mixed research methods should also be used to improve the investigation of influential factors that promote or inhibit nursing professionalism and their underlying mechanisms.

5. Conclusion

Currently, the connotation of nursing professionalism needs to be enriched, which will facilitate further exploration of the level of nursing professionalism in the future. Although there are various assessment tools for nursing professionalism, their reliability and validity still need to be verified, and specific assessment tools applicable to different cultural backgrounds are urgently required. The research methods of influential factors related to nursing professionalism should be diversified, while further enhancements are needed for interventional research designs. The following research should prioritize the exploration and construction of nursing professionalism's connotation, by drawing upon well-established theoretical models from various countries for the development of assessment tools. In addition, employing mixed research methods can facilitate the investigation of influential factors associated with nursing professionalism, and diverse intervention measures can be implemented to enhance professionalism levels and indirectly improve the quality of nursing services.

6. Implications for Nursing Management

The study of nursing professionalism provides an in-depth understanding of nursing work and offers guidance for nursing managers to support the development of nursing staff and improve their job satisfaction. Nursing professionalism constitutes a fundamental aspect of nursing practice, contributing to the improvement of the quality of nursing care, enhancement of cooperation between medical teams, and growth of reputation of medical institutions [30]. To ensure the safe and efficient working of nurses, nursing managers should provide a conducive working environment with necessary facilities and equipment, enhance their professional education and training, as well as strengthen their professional awareness and sense of responsibility. In addition, incentive mechanisms should be established to reward and commend outstanding nurses, thereby fostering their motivation to actively showcase their professional abilities and uphold professionalism. Only through

continuous enhancement of their competence can nurses deliver high-quality nursing services to patients and achieve the sustainable development of the nursing profession.

Data Availability

Data supporting the findings of this study are available upon reasonable request from the corresponding author.

Ethical Approval

The paper does not require ethical approval.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Lingyun Tian and Hongmei Gao conceptualized and designed the study. Jing Jiang and Mengyuan Liu performed data acquisition, analysis, and interpretation. Jing Jiang and Mengyuan Liu drafted the manuscript. Lingyun Tian, Hongmei Gao, and Yinglan Li critically revised important knowledge content. All authors submitted the version for final approval. Jing Jiang and Mengyuan Liu are co-first authors.

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Supplementary Materials

S1: document retrieval strategies in various databases. This file includes the detailed search strategies for each database. (*Supplementary Materials*)

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Research Article

Nursing Students' Competency about Writing Nursing Care Plan: An Exploratory Study in Iran

Ali Jabraeelzadeh Kamblash ¹, Mohammad Javad Jafari ¹, Reza Nemati-Vakilabad ^{1,2},
Mohammad Reza Mojebi ¹, Pouya Mostafazadeh ¹, and Alireza Mirzaei ³

¹Students Research Committee, School of Nursing and Midwifery, Ardabil University of Medical Sciences, Ardabil, Iran

²Student Research Committee, School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran

³Department of Emergency Nursing, School of Nursing and Midwifery, Ardabil University of Medical Sciences, Ardabil, Iran

Correspondence should be addressed to Alireza Mirzaei; alirezamirzaei9015@gmail.com

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Background. By utilizing the nursing care process, healthcare professionals can implement nursing knowledge effectively and efficiently, ultimately leading to a significant improvement in the quality of care provided. **Objective.** This study aimed to assess writing nursing care plan competence among Ardabil nursing students in northwestern Iran. **Methods.** The study involved 248 nursing students from the second to eighth semesters in three nursing and midwifery schools located in the Ardabil province of northern Iran. The data were collected using a simple random sampling method and included a demographic questionnaire along with a survey questionnaire on nursing care plan writing skills. This was conducted between May and June 2023. Descriptive statistics, Pearson correlation, *t*-test, ANOVA, and multiple linear regression analyses were conducted for data analysis. **Results.** The mean score (SD) for writing a nursing care plan in a student survey was 3.35 (0.57) on a scale of 1 to 5. The survey's weighted mean score for each dimension is as follows: data gathering (*D*) = 3.40 (0.73), identification of client's problems (*P*) = 3.40 (0.73), sustainable goals (*G*) = 3.31 (0.77), appropriateness of intervention (*I*) = 3.30 (0.67), and recognizing outcomes (*O*) = 3.37 (0.69). This indicates that the students performed well overall. However, the lowest score was in the appropriateness of interventions dimension. Multiple linear regression analysis revealed that four variables, mean score of grade point average (GPA), age, academic term, and time spent studying (hours per day), were significant predictors of the student survey's scores on writing nursing care plans. These variables could predict 61% of the total variance. **Implication for Nursing Management.** Nursing school administrators can establish programs to improve education and practice in nursing care plan development based on this study. They can use these findings to enhance nursing education and practice for students, which will ultimately lead to better nursing care plans. Administrators should ensure that students have the necessary skills for writing efficient care plans and provide training courses to improve their writing and critical thinking skills. Policies can be implemented to encourage students to increase their study hours and maintain quality care programs. **Conclusion.** Nursing students are skilled in creating well-written nursing care plans that follow the nursing process. The quality of these plans improves with higher GPAs and longer study hours. To enhance nursing care plans, nursing education should focus on developing skills and allocating sufficient time for studying and practicing. Collaborating with faculty and administrators, as well as using reliable resources, can also help improve the quality of care plans.

1. Introduction

Nursing care is a critical aspect of nursing practice that involves efficiently managing care for patients [1]. The nursing process is a scientific approach that is widely

accepted and involves five stages: assessment, nursing diagnosis, planning, implementation, and evaluation [2, 3]. The nursing process is a problem-solving method that uses scientific reasoning, critical thinking, and problem-solving skills to guide nurses in providing individualized patient care

according to their unique needs [1, 2]. The primary objective of nursing care is to provide high-quality care that enhances patient outcomes [4, 5]. The nursing process is a fundamental policy and principle for nursing care and it promotes analytical reasoning and standardizes performance among nurses [3]. Its effective implementation in patient care enhances nursing efficiency, facilitates care documentation, and provides a unified language for the nursing profession [6]. Nursing is a globally accepted approach in clinical practice to deliver quality, individualized patient care [2]. Nursing students are expected to demonstrate high competency levels in clinical settings [7].

Healthcare providers must possess practical knowledge, skills, and attitudes to carry out care tasks effectively [8]. Maintaining high standards of nursing performance is a challenge for the healthcare sector of any country [9]. Weak nursing competencies can result in low-quality healthcare and increased mortality rates [2]. According to a study by Seçer and Karaca, 93.4% of nurses believed the nursing process should be used for care [1]. Another survey by Zeleke et al. reported that 74.7% of nurses followed the process [3]. Assessing the skills of nursing students can provide accurate information for better planning and management at educational and practical levels [10]. Precise educational strategies are necessary to improve future nursing competencies [11].

Nursing education management is crucial for bridging the gap between theory and practice in the nursing process. Assessing the skills and effectiveness of nursing students is essential for their development and improvement in the nursing process [10]. Evaluating the quality of nursing process development by students helps enhance their competencies in patient care management [5]. Nursing instructors need a clear understanding of critical competencies in nursing to effectively support their students and seize opportunities to assist them [11]. Nursing students must be well prepared and qualified to plan care and emphasize accurate documentation for patient safety. Mastering the art and science of writing a nursing process is crucial for every student [5]. At the undergraduate level, nursing students require varying support, supervision, and regulatory guidance to learn skills such as physical examination and nursing processes while gaining practical experience [12].

Implementing the nursing process in hospitals is challenging due to factors such as lack of time, inadequate training, insufficient managerial support, low motivation, shortage of specialized individuals, unclear job descriptions, and low salaries [2, 6]. One solution is to involve nursing mentors who can provide courses and active learning strategies to improve nursing students' competency. National policy frameworks and interventions are necessary to enhance education and the implementation of the nursing process in clinical settings [2, 3, 6]. Adequate staffing levels and reduced workloads for individual nurses are crucial for effectively using the nursing process and improving patient care quality [6]. Standardizing nursing process documents across all hospitals can streamline the process and enhance problem-solving skills [3]. Positive attitudes and nursing

students' ability to develop and implement the nursing process can improve the quality of patient care [2, 13–15].

Optimizing the nursing process is essential for providing quality patient care, reducing expenses, and minimizing medical errors. Focusing on research in this area can lead to better patient outcomes, lower healthcare costs, and improved community health. Nursing students have a unique opportunity to develop their nursing process development skills, contribute to enhancing healthcare outcomes, and improve the quality of patient care. This study aims to evaluate the competency of Ardabil nursing students in writing nursing care plans in Northwestern Iran.

2. Materials and Methods

2.1. Setting, Sample, and Data Collection. A cross-sectional, descriptive study was conducted to investigate the competencies of nursing students in writing nursing care plans. The study included nursing students from the second to eighth semesters, studying at nursing schools in Ardabil province, located in northern Iran. The Ardabil province has three nursing and midwifery schools: Ardabil, Meshgin, and Germe. Nursing students in Iran learn the nursing process in theoretical courses such as principles and skills of nursing and nursing concepts in the first semester, which they use during their internships. First-semester students were excluded from the study as they had yet to pass the nursing process unit. The total number of nursing students in these schools was 667. Using Epi Info StatCalc version 7 software, a sample size of 244 was estimated at a 95% confidence level and a 0.05 margin of error. Considering a nonresponse rate of 10%, the final sample size was determined to be 268 individuals. The sample attrition rate in this study was 8%, with 22 incomplete questionnaires removed due to missing data. The required number of samples from each center was distributed among second-, third- and fourth-year students based on their population size. Therefore, students from each year were randomly selected for the study (152 from Ardabil nursing and midwifery school, 51 from Germe nursing school, and 45 from Meshgin nursing school). Data from 248 samples were analyzed and collected face-to-face based on the student's educational program from May to June 2023.

2.2. Measures. Data were collected through a two-part questionnaire: (1) sociodemographic variables and (2) student survey on writing a nursing care plan.

2.2.1. Sociodemographic Variables. The data collection tools comprised a demographic information questionnaire and a student survey on writing a nursing care plan. The demographic information questionnaire included questions related to demographic characteristics such as age, gender, marital status, academic term status, grade point average (GPA)—which is graded on a scale of 0 to 20, interest in nursing commitment, nursing school or city of study, participation in a nursing process course (yes or no), interest in the nursing field (yes or no), and time spent studying (in hours per day).

2.2.2. The Student Survey on Writing Nursing Care Plan Questionnaire. In 2020, Salvador et al. developed a questionnaire to evaluate the competency of nursing students in developing nursing care plans. The student survey on writing a nursing care plan consists of 25 items categorized into five domains: (1) data gathering (*D*); (2) identification of client's problems (*P*); (3) sustainable goals (*G*); (4) appropriateness of intervention (*I*); and (5) Recognizing outcomes (*O*). Participants respond to questions using a 5-point Likert scale (poor = 1, fair = 2, good = 3, very good = 4, excellent = 5), and the overall mean score is interpreted from poor to excellent [5]. This questionnaire was translated and cross-culturally adapted in Iran by Ramezanzadeh et al. [10] in 2023. Permission to use the original questionnaire [5] and the translated version in Iran was obtained. Internal consistency was assessed using Cronbach's alpha coefficient, which was 0.93 in Salvador's study and 0.95 in Ramezanzadeh et al.'s study [10]. Our analysis yielded a Cronbach's alpha coefficient of 0.91, indicating high internal consistency among the measured variables.

2.3. Ethical Considerations. The Ethics Committee of Ardabil University of Medical Sciences approved the present study with a corresponding ethics code (code number = IR.ARUMS.REC.1402.034). Eligible individuals interested in participating were informed about the study's objectives and encouraged to participate voluntarily. Only those who provided written informed consent and willingly agreed to participate were given the questionnaire. The confidentiality of their responses was ensured, and there would be no adverse consequences resulting from their refusal to participate. All researchers involved in the study were responsible for distributing and collecting the questionnaires, and they took full responsibility for ensuring that the participant's privacy and confidentiality were maintained. The questionnaire was self-reported, and it took 5 to 15 minutes to complete. The first page of the questionnaire included details of the study objectives, confidentiality, anonymity, and privacy of the respondents. The participants' responses were kept confidential, and the researchers involved were responsible for distributing and collecting the questionnaires.

2.4. Data Analysis. To describe the demographic characteristics and research variables, descriptive statistics such as percentages, frequencies, mean, and standard deviation were used. The questionnaire items were analyzed using mean, standard deviation, and a 95% confidence interval. *T* test, ANOVA, and Pearson correlation were used to examine the difference and relationship between the main study variable and demographic factors of nursing students. To evaluate the predictors of student surveys on writing nursing care plans, multiple linear regression analysis was employed, using demographic factors as independent variables. A significance level of 0.05 was set for this study.

3. Results

A total of 248 nursing students participated in this study, comprising 134 females (54%) and 114 males (46%). They had a mean GPA of 16.37 (1.29) on a scale of 0–20. Out of the total participants, 231 (85.9%) were single. The study included 152 students (61.3%) from the midwifery nursing department in Ardabil. Among them, 207 (83.5%) had not completed the nursing process in their education, while 199 (80.2%) showed a keen interest in nursing. In addition, 96 students (38.7%) studied for one to two hours daily. You can check Table 1 for more information on the demographic characteristics of the participants.

The scores of Table 2 from the survey questionnaire for student survey on writing nursing care plans were organized into domains. In the data gathering subgroup, the item that received the highest rank mean score 3.45 (standard deviation (SD) = 0.98) was "I utilize a systematic way in collecting my objective data like Gordon's Assessment or any other pertinent assessment tool," while the lowest level among nursing students 3.33 (0.83) was for the item "I utilize therapeutic communication throughout patient assessment." In the identifying clients' problem subgroup, the highest-ranked phrase 3.43 (0.95) was "I am aware of the various ways on how to formulate good nursing diagnoses," while the lowest-ranked item 3.34 (1.02) was "I use and refer to NANDA resources every time I formulate my client's nursing diagnosis." In addition, in the formulating sustainable goals subgroup, the item that obtained the highest rank 3.34 (1.07) was "I specify in my planning the recipient and reason for formulating the nursing care plan," while the lowest-ranked item 3.28 (0.99) was "I put a time frame whenever I formulate my nursing care plan for evaluation." In the providing appropriate interventions subgroup, the item that received the highest score 3.35 (1.01) was "I base my independent interventions on the identified needs of my patient," while the lowest score 3.20 (0.96) was received by the item "I incorporate interdependent collaborations with various healthcare departments whenever I plan care for my client." Finally, in the recognizing Client's outcomes subgroup, the item that received the highest score 3.45 (0.95) was "I seek back to my planning's goals and objectives if I have achieved my SMART plan." while the lowest score 3.29 (1.09) was received by the item "I review my nursing care plan and decide whether to terminate, continue and change it after a series of evaluation." The overall mean score of the student survey on writing nursing care plans was 3.35 (0.57) on a scale of 1 to 5.

Table 2 presents the weighted mean score and interpretation for each dimension. The scores we obtained are as follows: (a) data gathering (*D*) = 3.40 (0.73), which is considered good; (b) identification of client's problems (*P*) = 3.40 (0.73), which is also good; (c) sustainable goals (*G*) = 3.31 (0.77), again, good; (d) appropriateness of intervention (*I*) = 3.30 (0.67), good; and (e) recognizing outcomes (*O*) = 3.37 (0.69), which is, again, good. The overall weighted mean score is 3.35 (0.57), indicating that the students' nursing care plan (NCP) writing skills are of good quality. The dimension with the lowest score was the appropriateness of intervention.

TABLE 1: Sociodemographic characteristics of the study sample ($N=248$).

Characteristics	Categories	Mean (n)	SD (%)
Grade point average (grading is based on a 0 to 20 score)		16.37	1.296
Age	18–22	122	49.2
	23–27	126	50.8
Gender	Female	134	54.0
	Male	114	46.0
Marital status	Single	213	85.9
	Married	35	14.1
Semester	2	23	9.3
	3	47	19.0
	4	23	9.3
	5	56	22.6
	6	26	10.5
	7	55	22.2
Interest for nursing commitment	8	18	7.3
	Yes	54	21.8
	No	194	78.2
Nursing school	Ardabil	152	61.3
	Meshgin	45	18.1
	Germi	51	20.6
Nursing process course	Yes	41	16.5
	No	207	83.5
Interest in the nursing field	Yes	199	80.2
	No	49	19.8
Time spent studying (hours per day)	Less than 1 hour	71	28.6
	Between 1 and 2 hours	96	38.7
	Between 2 and 3 hours	72	29.0
	More than 3 hours	9	3.6

Table 3 summarizes the relationship between the student survey on writing a nursing care plan and the demographic factors of nursing students. It shows the study's overall mean scores and range based on the participants' demographic characteristics. The results indicate a significant positive correlation between the overall mean score of the student survey on writing a nursing care plan and the mean score of grade point average (GPA), academic term, interest in nursing commitment, interest in the nursing field, and time spent studying. On the other hand, there is a significant inverse correlation between the overall mean score of the student survey on writing a nursing care plan and age.

The results of multiple regression analysis, indicating the predictors of the student survey on writing a nursing care plan, are shown in Table 4. A considerable variable regression analysis was conducted using the student survey on writing a nursing care plan as the dependent variable and demographic characteristics as the independent variable. Of these ten variables, 4 were significant predictors of the student survey on writing a nursing care plan. The regression model's coefficient of determination (R^2) indicates that 61% of the total score of the student survey on writing a nursing care plan can be explained by the input variables in the model. Among the input variables in the model using the ENTER method, as reported in the table, there was a statistically significant relationship between mean GPA, age, academic term, and time spent studying (hours per day).

4. Discussion

Nursing students play a crucial role in providing continuous care and improving the healthcare system in the future. The nursing process serves as a framework for nursing care, an essential tool for implementing nursing knowledge that enhances the quality of care. Writing nursing care plans is a skill and competency identified in the nursing profession. This study was conducted to investigate nursing students' competence in writing nursing care plans.

Although students showed a good score in writing NCP, previous studies have indicated that nursing students require appropriate training to improve their implementation of the nursing process [6, 16]. There are several barriers to implementing the nursing process, such as high patient-to-nurse ratios, inadequate and improper training, lack of continuous supervision and control, insufficient time allocated for training, and lack of retraining opportunities [17]. Nursing students must be familiar with real-life conditions and appropriate tools to effectively implement the process. Addressing these obstacles can lead to better outcomes. Improper implementation of the nursing process is often due to insufficient education, inadequate attitudes, and a lack of training in nursing schools [18]. Nurses who are more familiar with the nursing process and use it in their care have a more positive attitude towards it [3]. The nursing process enhances the quality of nursing care by ensuring individualized and high-quality care [6, 19]. To ensure

TABLE 2: The status of Iranian nursing student survey on writing nursing care plan (N = 248).

Items	Mean	SD
<i>Data gathering (D)</i>	3.40 good	0.734
(1) I utilize therapeutic communication all throughout the duration of patient assessment	3.33	0.831
(2) I maximize my time during the entire course of patient-nurse interaction	3.40	0.985
(3) I find it easy to recognize irregularities from normal to abnormal changes based on my assessment	3.38	0.915
(4) I utilize systematic way in collecting my objective data like Gordon's Assessment or any other pertinent assessment tool	3.45	0.980
(5) I make sure that the client's given data are coherent	3.42	0.923
<i>Identification of client's problems (P)</i>	3.40 good	0.738
(6) I determine my client's needs based from my assessment based from Maslow's hierarchy of needs	3.42	0.999
(7) I categorize my client's needs based from the various types of nursing diagnoses like actual, risk, wellness, syndrome, and possible	3.42	0.991
(8) I am aware of the various ways on how to formulate good nursing diagnoses	3.43	0.958
(9) I understand the different terminologies used in formulating nursing diagnosis	3.35	1.039
(10) I use and refer to NANDA resources every time I formulate my client's nursing diagnosis	3.34	1.034
<i>Sustainable goals (G)</i>	3.31 good	0.777
(11) I specify in my planning the recipient and reason for formulating the nursing care plan	3.34	1.078
(12) I look on the measurable quantifiers that will be used as parameters for my planning	3.33	1.052
(13) I make sure that the goals and objectives I set for my nursing care plan are attainable	3.30	1.038
(14) I see to it that my nursing care plan is realistic and does not only base from imagination	3.31	1.062
(15) I put time frame whenever I formulate my nursing care plan for evaluation	3.28	0.998
<i>Appropriateness of intervention (I)</i>	3.30 good	0.679
(16) I assessed my patient before I start my interventions to come up with baseline data and use it as my parameters for ongoing evaluation	3.32	0.978
(17) I based my independent interventions based from the identified needs of my patient	3.35	1.012
(18) I put stand-alone rationales in all the nursing interventions I plan to implement for my patient	3.28	0.965
(19) I resort getting doctor's orders when I am planning for my nursing interventions especially with pharmacological, medical and surgical treatments and modalities	3.32	0.990
(20) I incorporate interdependent collaborations with various healthcare departments whenever I plan care for my client	3.20	0.966
<i>Recognizing outcomes (O)</i>	3.37 good	0.690
(21) I re-assess my patient after all the nursing interventions done	3.38	1.007
(22) I go back to my nursing diagnosis if my nursing care plan answered the client's health needs	3.40	0.989
(23) I seek back to my planning's goals and objectives if I have achieved my SMART plan	3.45	0.955
(24) I evaluate all the nursing interventions done to my client to check and validate its appropriateness and effectiveness	3.35	1.062
(25) I review my nursing care plan and decide whether to terminate, continue and change it after series of evaluation	3.29	1.093
<i>Total</i>	3.35 good	0.576

Note. Interpretation: excellent = 4.21–5.0; very good = 3.41–4.20; good = 2.61–3.40; fair = 1.81–2.60; poor = 1.00–1.80.

mastery and translation into practice, nursing educators should use active teaching strategies [6]. Patient care skills and the nursing process should be assessed and monitored through evaluation courses [17].

The results showed nursing students have good writing skills for creating nursing care plans (NCPs). They are

proficient in data collection during the evaluation phase, with an average score of 3.40. In a study by Salvador et al., nursing students performed excellently [5]. Assessing patients is the first step in nursing and guiding interventions [20]. Nurses' initial patient assessment translates theory into practice and demonstrates the value of knowledge, skills, and attitudes in

TABLE 3: Relationship between nurses' sociodemographic characteristics and student survey on writing nursing care plan ($N = 248$).

Characteristics	Categories	Mean	SD	Statistical	p value
Grade point average		16.37	1.296	$r = 0.688$	$p < 0.001$
Age	18–22	3.04	0.468	$t = -9.816$	$p < 0.001$
	23–27	3.65	0.509		
Gender	Female	3.32	0.556	$t = -0.907$	$p = 0.365$
	Male	3.39	0.599		
Marital status	Single	3.34	0.580	$t = -0.951$	$p = 0.343$
	Married	3.44	0.551		
Semester	2	2.88	0.529	$F = 34.77$	$p < 0.001$
	3	3.00	0.458		
	4	3.08	0.347		
	5	3.22	0.477		
	6	3.35	0.328		
	7	3.99	0.330		
Interest for nursing commitment	Yes	3.54	0.518	$t = 2.733$	$p = 0.007$
	No	3.30	0.582		
Nursing school	Ardabil	3.33	0.550	$F = 1.467$	$p = 0.233$
	Meshgin	3.31	0.583		
	Germi	3.48	0.638		
Nursing process course	Yes	3.34	0.480	$t = -0.162$	$p = 0.872$
	No	3.36	0.594		
Interest in the nursing field	Yes	3.42	0.557	$t = 3.99$	$p < 0.001$
	No	3.07	0.569		
Time spent studying (hours per day)	Less than 1 hour	3.01	0.462	$F = 34.58$	$p < 0.001$
	Between 1 and 2 hours	3.26	0.501		
	Between 2 and 3 hours	3.71	0.510		
	More than 3 hours	4.16	0.143		

TABLE 4: Multiple regression analysis predicting student survey on writing nursing care plan according to sociodemographic characteristics ($N = 248$).

Variables	B	S. E	Beta	t	Sig	95.0% confidence interval for B	
						Lower bound	Upper bound
(Constant)	-1.247	0.402		-3.102	0.002	-2.039	-0.455
Age	0.164	0.071	0.142	2.323	0.021	0.025	0.303
Gender	0.050	0.049	0.043	1.028	0.305	-0.046	0.145
Marital status	0.050	0.071	0.030	0.708	0.479	-0.090	0.190
Semester	0.071	0.023	0.226	3.047	0.003	0.025	0.118
Grade point average	0.216	0.022	0.486	10.044	0.000	0.174	0.258
Interest for nursing commitment	-0.028	0.066	-0.020	-0.423	0.673	-0.157	0.102
Nursing school	0.002	0.033	0.003	0.059	0.953	-0.063	0.067
Nursing process course	0.083	0.066	0.053	1.248	0.213	-0.048	0.214
Interest in the nursing field	0.052	0.067	0.036	0.784	0.434	-0.079	0.184
Time spent studying (hours per day)	0.079	0.038	0.116	2.058	0.041	0.003	0.155

$R^2 = 0.61$, adjusted $R^2 = 0.59$, $F (37.43)$, and $p < 0.001$.

providing individualized care to complex healthcare needs. It is crucial for nursing diagnosis and the nursing process [3]. In Namibia, nursing students may miss out on physical examination aspects due to not completing all stages of nursing. This can lead to incorrect diagnoses as each stage of nursing is interrelated and a failure in one stage can affect other stages [21]. The difference in mean data collection between the two communities is due to cultural differences [5].

Among the data collection items, the lowest score was related to "I use therapeutic communications throughout the patient assessment." Good communication and

collaboration are important competencies in patient-centered care and nursing practice. Students' perception highlights that nursing is influenced by various aspects of patient care, including patient preferences and effective communication. Language barriers and patients' preferences for professional nurses may hinder nursing students' ability to apply the nursing process [11, 21].

Based on our results, in the second component of the survey, students had a good quality level in writing NCP, meaning that nursing students have good foundations during problem identification or nursing diagnoses

($P = 3.31$). As per Salvador et al., the lowest score was related to “I use NANDA nursing diagnosis resources every time I formulate a nursing diagnosis.” Nursing diagnosis should be based on assessment results and used as a reference for interventions [22]. Nurses and nursing students should apply the nursing process to enhance patient care quality and safety [23]. Nursing students learn education topics and use the nursing process to understand patient health problems and study evidence [24]. A nursing diagnosis reflects the student’s ability to identify patient problems during the initial assessment. A correct diagnosis leads to proper intervention and evaluation, while an incorrect diagnosis can have the opposite effect. Identifying patient problems is critical for quality care [25].

The study results indicated that in the third dimension, nursing students also had good quality in developing nursing processes, meaning they had reasonable primary goals (G) or planning for patient nursing diagnoses. In Salvador et al. study, most nursing students felt the management course provided enough knowledge to set patient goals. Nursing mentors should teach SMART goal-setting principles [5]. A review in Iran found that the nursing process is not commonly used in low-income countries like Iran, Ethiopia, Kenya, and Taiwan. Reasons include a lack of awareness among nursing faculty about the process, inadequate hospital infrastructure, and insufficient support from nursing organizations [26]. It is imperative to adopt and implement appropriate policies that ensure nursing students can confidently execute the nursing process in the clinical environments of low-income countries on a widespread and continuous basis.

The lowest score among the items was related to “I set a time frame when scheduling my nursing care plan for evaluation.” The nursing process is challenging, time-consuming, and difficult to perform. Taking care of multiple patients simultaneously can disrupt decision-making. Software can help manage time and streamline the process [26]. Nurses cite workload and staff shortages as obstacles to using the nursing process effectively in patient care, as per Bassah et al. and colleagues [6]. It is essential that managers take prompt action to overcome any obstacles hindering nurses from implementing the nursing process effectively. By doing so, nurses will have adequate time to provide individualized care to patients, leading to better health outcomes.

According to the study results, nursing students had good-quality writing NCP in the fourth dimension. Nursing students could use appropriate interventions (I) based on sound planning. In the Salvador et al.’s study, students achieved a perfect score. In the Sendir et al.’s study, nursing students faced difficulty determining nursing interventions [27]. The appropriate diagnosis of intervention depends on the nurse’s knowledge and awareness of the disease and the patient’s status. According to Zeleke et al., nurse awareness is the most predictive factor for the nursing process [3]. Students had the lowest score in the fourth-dimension item, “Whenever I intend to take care of my patient, I consider the collaborative efforts with various healthcare departments.” One of the issues surrounding nursing profession

development includes physician dominance in healthcare systems. When nurses demonstrate sufficient ability to improve the quality of care they provide, other health teams can identify the nursing profession [11].

The study results indicated students exhibited high-quality nursing writing skills in the fifth dimension. This finding meant that nursing students had good foundations in evaluating outcomes (O) or evaluating interventions performed. However, in the Salvador et al.’s study, students had achieved excellent grades. Nursing students must master the art of writing a care plan using all available resources to ensure optimal patient health [5]. Among the items related to the fifth dimension, the lowest score was related to the item “I review my nursing process and decide whether to terminate it after a series of evaluations, continue it, or make changes.” Through the nursing process, nursing students and nurses play a significant role in evaluating nursing care results [9]. The evaluation stage assesses nursing care programs for efficiency, completeness, and adequacy while identifying deficiencies in previous programs [28]. Nursing education is crucial in preparing students with the knowledge and skills needed for effective nursing practice [10]. Nursing instructors shape the future of nursing. They must equip students with the skills to deliver quality care. The nursing process and final evaluation are critical components of patient care. Prioritizing them empowers nurses to deliver the best care and improve patient health outcomes. Let us support the full implementation of the nursing process and final evaluation.

The findings suggest that as students’ GPAs increase, their scores in writing nursing care plans rise, which is consistent with prior research [29]. According to a study by Vasli et al., GPA is a significant predictor of clinical competency scores among nursing students [29]. It is possible that academic skills have an impact on clinical skills, which could explain the results. Students who excel in their academic studies and have high GPAs may have a better understanding of nursing concepts, which can have a positive impact on their clinical skills. On the other hand, students with lower GPAs may need to have a deeper understanding and application of the nursing process. Therefore, it is crucial for students who did not receive satisfactory GPAs during their academic years to enhance their competence in writing nursing process formulations through more practice and study. However, further research is required to comprehend and confirm this relationship fully.

According to the results of the present study, as students’ progress through their academic terms, their competency scores in nursing process formulation increase, which is consistent with the findings of Huang et al. According to Huang et al. study, first- and second-year nursing students had lower nursing competency scores than third- and fourth-year students [11]. The use of the nursing process depends on many factors, including knowledge and skills that ideally should be developed in nursing students throughout their education [21]. In addition, as students’ age, their competency scores in nursing process formulation also increase. This finding contradicts the results of Bassah et al.’s study [6]. These findings may be due to improved

clinical experience and practice in formulating the nursing process with age and longer academic terms.

The findings of this study suggest that an increase in nursing students' time spent studying (hours per day) can lead to an improvement in their ability to develop nursing processes. This may be due to the higher level of knowledge that nursing students possess due to increased studying and staying up-to-date with the latest information. Therefore, nursing instructors and managers should promote programs that enhance students' academic motivation [30]. Nursing is a dynamic and demanding profession requiring high knowledge and experience [31]. As such, nursing students should continuously study to become familiar with the latest advancements in the field and provide the best possible care to patients. In addition, increased studying helps students perform better in nursing and cope with this profession's complex and risky conditions.

4.1. Limitations. The study's small sample size of nursing students presents a significant limitation, which may compromise the generalizability of the results. To ensure more accurate and reliable outcomes, it is imperative for future studies to consider evaluating nursing care programs with larger sample sizes. It is important to note that this study solely focused on undergraduate nursing students at Ardebil University of Medical Sciences; thus, caution should be exercised when applying these findings to the entire population of Iran. In order to enhance the generalizability of the findings, it is highly recommended to conduct multicenter studies involving students from various universities in Iran as well as different regions of the world. Lastly, it is crucial to address the limitations of this study by conducting further research in the future, which will contribute to a more comprehensive understanding of the topic.

4.2. Implications for Nursing Management. Nursing schools must prioritize the development of practical care plan writing skills among their students. Teachers should use effective teaching methods and implement comprehensive training programs to facilitate learning [32]. Students should also be encouraged to aim for greater efficiency and create high-quality care programs. These initiatives will help to advance research methodologies and improve nursing studies. Investing in these efforts will ensure that nursing education meets the needs of society and empower students to promote community health.

5. Conclusions

According to the study, nursing students can create high-quality writing nursing care plans. Nurses are essential as caregivers, coordinators, educators, and information sources [33]. The study found that nursing students with higher GPAs and more time studying produced better nursing care plans. Therefore, it is recommended that students focus on improving their skills in various courses during their training period. They should strive to have a deep and accurate understanding of nursing concepts and principles and

devote sufficient time to studying and practicing nursing care plans. Using reliable and up-to-date resources in nursing care planning and collaborating with faculty members and school administrators can also help improve the quality of nursing care programs. Based on these findings, school nursing administrators can develop programs to enhance the quality of education and training in nursing care planning for students. However, further studies are needed to conduct additional qualitative research to analyze the ability of nursing students to write care plans.

Data Availability

The data supporting the results of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethical Approval

This study was performed in line with the principles of the Declaration of Helsinki. The project was approved by the Ethics Committee of the Ardabil University of Medical Sciences (IR.ARUMS.REC.1402.034).

Consent

All subjects were informed about the purpose and content of the study, and all provided written informed consent.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

All the authors were involved in designing the study. Mohammad Javad Jafari, Pouya Mostafazadeh, Mohammad Reza Mojebi, and Ali Jabraeelzadeh Kamblash carried out the data collection and data entry. Alireza Mirzaei and Reza Nemati-Vakilabad performed the statistical analyses and interpretations. Alireza Mirzaei, Ali Jabraeelzadeh Kamblash, Reza Nemati-Vakilabad, Mohammad Javad Jafari, Pouya Mostafazadeh, and Mohammad Reza Mojebi wrote the final report and manuscript. All the authors have read and approved the final manuscript.

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Research Article

Nursing Students' Personality Traits and Their Attitude toward Artificial Intelligence: A Multicenter Cross-Sectional Study

Gihan Mohamed Mohamed Salem ^{1,2}, Heba Emad El-Gazar ³, Abeer Yahia Mahdy ^{4,5},
Talal Ali F. Alharbi ^{6,7} and Mohamed Ali Zoromba ^{8,9}

¹Psychiatric and Mental Health Nursing Department, Faculty of Nursing, Benha University, Banha, Egypt

²Department of Nursing, College of Applied Medical Sciences, University of Bisha, Bisha, Saudi Arabia

³Administration Department, Faculty of Nursing, Port Said University, Port Fuad, Egypt

⁴Medical-Surgical Nursing Department, Faculty of Nursing, Najran University, Najran, Saudi Arabia

⁵Medical Surgical Nursing Department, Faculty of Nursing, Benha University, Benha, Egypt

⁶Department of Community, Psychiatric and Mental Health Nursing, College of Nursing, Qassim University, Buraidah, Saudi Arabia

⁷College of Nursing, Sulaiman Al Rajhi University, Al Bukayriah, Saudi Arabia

⁸Nursing Department, College of Nursing, Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia

⁹Department of Psychiatric and Mental Health Nursing, Faculty of Nursing, Mansoura University, Mansoura, Egypt

Correspondence should be addressed to Mohamed Ali Zoromba; zromba2010@mans.edu.eg

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Background. Despite the importance of studying factors contributing to nursing students' attitudes toward artificial intelligence, yet according to our knowledge, no study has addressed the relationship between personality traits and the attitude of nursing students toward artificial intelligence. **Aim.** This study aimed to unveil whether nursing students' personality traits are related to their attitude toward AI. **Methods.** This multicenter cross-sectional study included 218 nursing students from three governmental universities across various regions of the Kingdom of Saudi Arabia. Data were gathered online, utilizing the Big Five Inventory, the General Attitudes toward Artificial Intelligence Scale, and a demographic questionnaire. Descriptive statistics, Pearson's correlation, and regression analysis were employed. The research complied with the STROBE checklist. **Results.** Findings indicated that nursing students with a high score in the openness trait displayed positive attitudes toward artificial intelligence. Conversely, those who scored high in neuroticism and agreeableness exhibited fewer positive attitudes toward artificial intelligence and more negative attitudes toward artificial intelligence. Additionally, nursing students who ranked high in conscientiousness showed a negative attitude toward artificial intelligence. **Conclusion.** Except for extraversion, personality traits appear to predict attitudes toward artificial intelligence. **Implications for Nursing Management.** The current study provides a foundation for understanding how generative AI can be integrated into nursing education and practice in a manner that is both effective and considerate of the diverse psychological profiles of students.

1. Introduction

Artificial intelligence (AI) is progressively shaping the scene of healthcare, with its integration becoming more pervasive across various domains such as patient care, diagnostics, and administrative tasks [1]. In recent years, the healthcare sector has perceived a surge in the adoption of AI technologies, ranging

from machine learning algorithms aiding in disease prediction to robotic assistance in surgical procedures [2]. The potential of AI to enhance efficiency, accuracy, and patient outcomes is widely acknowledged, necessitating a workforce that is adept and comfortable working alongside these technologies [3].

The integration of AI in healthcare settings is challenging due to trust, ethics, and job security concerns [4].

Addressing these issues proactively and fostering a positive outlook toward AI among nursing students can pave the way for smoother integration and optimal utilization of AI in healthcare [5]. Understanding nursing students' attitudes toward AI is crucial as it influences their future interactions with AI technologies and integration into healthcare practices [6]. Attitudes can vary, with younger, tech-savvy students often embracing AI, while older or less tech-savvy individuals may be skeptical [7, 8]. As future healthcare professionals, nursing students' attitudes will shape the broader workforce's readiness for AI [9, 10]. Studying these attitudes provides insights into the educational needs and interventions required to prepare future nurses for the AI-driven healthcare landscape. There is a pressing need to incorporate AI-related content into nursing curricula and training programs to equip students with the necessary knowledge and skills [11, 12]. By exploring the factors influencing these attitudes, educators and policymakers can devise targeted strategies to foster positive attitudes and readiness for AI integration [9].

The relationship between personality traits and attitudes toward technology or innovation has been the subject of extensive research, with several studies highlighting the significance of individual personality characteristics in shaping one's perception and acceptance of technology [13]. Drawing upon the technology acceptance model, which postulates that perceived affluence of usage and perceived helpfulness are key determinants of technology acceptance, it can be inferred that personality traits play a critical role in shaping these perceptions [14]. Moreover, the Big Five personality traits model provides a comprehensive framework to understand how different personality dimensions may influence attitudes toward AI [15, 16].

The Big Five personality traits framework categorizes personality into five dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism (OCEAN). Openness involves receptiveness to new experiences; conscientiousness denotes diligence and responsibility; extraversion encompasses sociability; agreeableness signifies compassion and cooperation; and neuroticism involves emotional instability and anxiety [17]. Individuals with high openness are likely to have positive attitudes toward AI due to their receptiveness to change [18]. In contrast, those high in neuroticism may have negative attitudes toward AI, perceiving it as threatening. Highly agreeable individuals might also be more skeptical of AI's impact on interpersonal aspects of patient care [19].

In the context of AI in healthcare, it is plausible to expect that these personality traits would play a significant part in shaping nursing students' attitudes toward AI. For instance, students high in conscientiousness may exhibit meticulousness in their interactions with AI, ensuring that all protocols are followed, but they may also be more critical of AI's potential limitations. Extraversion may influence how nursing students communicate and collaborate with AI technologies, with more extroverted students potentially being more open to engaging with AI in team-based settings. Thus, understanding how each of these personality traits correlates with attitudes toward AI is crucial for developing targeted educational and training interventions [11, 12].

Despite the increasing interest in the impact of AI on healthcare and the importance of fostering positive attitudes toward AI among healthcare professionals, there is a noticeable gap in the literature concerning the specific relationship between nursing students' personality traits and their attitudes toward AI [9]. Most existing studies have focused on healthcare professionals' attitudes toward AI in general, without delving into the nuanced ways in which individual personality traits may influence these attitudes [20–23].

Recent studies have begun to explore the intersection of AI, healthcare, and personality traits in various cultural settings. For example, research in South America has examined the role of personality in the acceptance of AI among healthcare workers, revealing distinct patterns influenced by cultural values and healthcare systems [18]. Similarly, studies from Africa have shed light on the unique challenges and opportunities presented by AI in healthcare, emphasizing the need for culturally sensitive approaches to AI integration [24]. In Asia, the rapid adoption of AI in healthcare has prompted investigations into the influence of personality traits on AI acceptance among nursing students and professionals, highlighting differences in attitudes compared to Western counterparts [9, 25, 26].

Furthermore, the few studies that have explored the relationship between personality traits and attitudes toward technology in healthcare have largely been conducted in Western and Eastern contexts, leaving a gap in our understanding of how these dynamics play out in the Middle East, especially the Kingdom of Saudi Arabia. Addressing this gap is imperative, as the cultural and educational context of the Kingdom of Saudi Arabia presents unique challenges and opportunities in the integration of AI in healthcare. The country has been making significant strides in incorporating AI into various sectors, including healthcare, as part of its Vision 2030 Strategic Plan [27–29]. However, to fully realize the potential of AI in enhancing healthcare delivery, it is crucial to understand how nursing students, who represent the future of the healthcare workforce in the region, perceive and interact with AI.

Aim of the Study. This study aimed to investigate the relationship between nursing students' personality traits and their attitudes toward AI.

1.1. Objectives

- (1) To investigate the relationship between nursing students' personality traits and their attitudes toward artificial intelligence (AI)
- (2) To identify the distinct personality traits of nursing students who have positive attitudes toward AI compared to those with negative attitudes
- (3) To determine which specific personality traits (e.g., openness, conscientiousness, extraversion, agreeableness, and neuroticism) predict nursing students' attitudes toward AI

1.2. Hypotheses

- (1) H1: nursing students' personality traits are significantly associated with their attitudes toward AI
- (2) H2: nursing students with a positive attitude toward AI exhibit distinct personality traits compared to those with a negative attitude toward AI
- (3) H3: specific personality traits (e.g., openness, conscientiousness, extraversion, agreeableness, and neuroticism) predict nursing students' attitudes toward AI

2. Methods

2.1. Design. A multicenter cross-sectional online survey was performed.

2.2. Participants and Setting. We recruited nursing students using convenience sampling from three governmental universities across three regions of the Kingdom of Saudi Arabia: Prince Sattam Bin Abdulaziz University, Bisha University, and Najran University. Eligible participants were undergraduate nursing students, from any year of their bachelor's program, at one of the three specified governmental universities in the Kingdom of Saudi Arabia, and willing to engage in the survey. Exclusion criteria include postgraduate students, students with mental health challenges or undergoing mental health therapy, or those enrolled in self-improvement or professional development courses.

Calculations for determining the sample size were conducted using G*Power software (version 3.1.9.4), leveraging a linear model calculation method [30]. The parameters employed consisted of a power level of 0.95, an alpha level of 0.01, an effect size of $d=0.15$ [31], and 9 predictors (five related to personality traits and four to demographics). These parameters pointed to a need for a minimum of 214 participants. A total of 218 nursing students completed the online survey.

2.3. Measures. The Big Five Inventory (BFI) and the General Attitudes toward Artificial Intelligence Scale (GAAIS), advanced in English, and a demographic questionnaire were used in the current study. Together, the English scales were translated into Arabic using the translation-back-translation technique [32]. Initially, the English scale was translated into Arabic by the primary researcher, and a skilled translator subsequently performed a back translation from Arabic to English. The back-translated version was then cross-checked with the original English scale, resulting in certain corrections to ensure a close alignment with the original content. A team of five nursing professors, who are experts in the field, revised the translated form in comparison with the genuine one to confirm that the terms used were equivalent and that the language was clear and easy to understand. After translation, the scales were initially tested with 31 nursing students to confirm the validity of the final version. Both

scales used a 5-point Likert scale for responses, with the scoring system ranging from 1 (strongly disagree) to 5 (strongly agree).

2.3.1. BFI. This scale was established by Benet-Martinez and John [33] to assess the five major personality traits using 44 items. These traits are "extraversion (8 items), agreeableness (9 items), conscientiousness (9 items), neuroticism (8 items), and openness (10 items)." Among nursing students, the trait with the highest score reflects their most dominant personality characteristic. In its original form, Cronbach's alpha for the scale varied from 0.65 to 0.84. In the current study, a confirmatory factor analysis (CFA) was conducted, contrasting two models. The initial model grouped all items of scale under one factor, whereas the later model examined a suggested structure of five distinct factors. The data suggested that the five-factor model was more fitting than the single-factor model, as evidenced by the following metrics: $\chi^2 = 1453.043$, $df = 892$, $\chi^2/df = 1.629$, CFI = 0.90, IFI = 0.89, and RMSEA = 0.054, in contrast to $\chi^2 = 4964.743$, $df = 911$, $\chi^2/df = 5.450$, CFI = 0.21, TLI = 0.21, and RMSEA = 0.143 for the single-factor model.

2.3.2. GAAIS. This scale was established by Schepman and Rodway [34] to gauge people's general attitudes toward AI. This scale encompasses 20 items with two dimensions: positive attitude toward AI (12 items) and negative attitude toward AI (8 items). Each dimension yields a separate score, with higher scores reflecting more intense attitudes, be they positive or negative, toward AI. In the original study, Cronbach's alpha for the positive dimension was 0.88 and 0.83 for the negative dimension. In this study, the CFA indicated that the two-factor model exhibited a more satisfactory structure compared to a one-factor model ($\chi^2 = 281.195$, $df = 169$, $\chi^2/df = 1.664$, IFI = 0.96, CFI = 0.96, and RMSEA = 0.055 vs. $\chi^2 = 619.023$, $df = 170$, $\chi^2/df = 3.641$, TLI = 0.82, CFI = 0.82, and RMSEA = 0.110).

2.3.3. The Demographic Questionnaire. The demographic questionnaire involved data about age, gender, marital status, and educational level.

2.4. Data Collection and Ethical Consideration. Data were collected through an online survey created using Google Forms, which is a readily available web-based survey platform. The survey link, attended by invitation, was disseminated to students via email and through private student Telegram groups affiliated with each university. The invitation letter outlined the study's purpose and specified the target participants. Participation was entirely voluntary, and confidentiality was guaranteed. An online informed consent method was provided, and participants were required to acknowledge their agreement by clicking on an "I agree" button before proceeding to the survey. To ensure data quality, all survey questions were mandatory, preventing the submission of incomplete responses. Additionally, measures were in place to prevent participants from submitting

multiple responses using a similar account or device. Once the number of submissions surpassed the predetermined sample size, data collection was halted. The data collection period spanned from mid-March to mid-June 2023. The Standing Committee of Bioethics Research (SCBR), Prince Sattam Bin Abdulaziz University, approved the study (Approval No. SCBR-181/2023).

2.5. Statistical Analysis. Statistical analyses were performed using SPSS version 27.0, with validity analysis performed in Amos version 23.0. Descriptive statistics, including counts, percentages, means, and standard deviations, were performed to depict participants' demographic features and study variables. Measures were taken to ensure the validity and reliability of the study variables. Differences in study outcomes based on demographic characteristics were examined using independent-samples *t*-tests and one-way analyses of variance (ANOVA). The Pearson *r* correlation coefficient was applied to ascertain the relationships between personality traits and attitudes toward AI. Stepwise multiple regression analyses were carried out for both positive and negative attitudes toward AI, focusing on variables that showed significance in the prior difference and correlation tests. To ensure model stability and the absence of multicollinearity, both tolerance and variance inflation factor metrics were examined and confirmed to be within acceptable limits.

2.6. Common Method Bias (CMB). The data for the current research were obtained solely from a lone source via self-reported methods, thereby heightening the risk of CMB. To mitigate current potentiality, both statistical and procedural strategies were implemented. Procedurally, participants received a thorough orientation regarding the study's aims, and assurances of voluntary participation, unwavering anonymity, and strict confidentiality were provided. Furthermore, the items within the study's scales were randomized and subjected to preliminary testing to augment clarity [35]. On the statistical front, Harman's single-factor test was adopted [36]. The results indicated that only 18.47% of the variance was due to a single factor, which is well below the 50% threshold [37], suggesting that CMV was not a predominant concern. Furthermore, the CFA of the scales addressing personality traits and attitudes toward AI demonstrated a satisfactory fit with a multifactor model than with a singular-factor model, pointing to an absence of widespread CMV.

3. Results

3.1. Preliminary Analysis. The study participants were predominantly female (81.7%), unmarried (88.1%), and were in their fourth year of education. The majority of the participants were aged 20 years or older, constituting 55.5%. There was no statistically significant difference in attitudes, positive or negative, toward AI based on the demographics of the nursing students. However, there were specific differences observed across the educational levels of students, and the

mean positive attitude score was highest among second-year students ($M = 3.62$), while the mean negative attitude score was highest among third-year students ($M = 2.61$). Interns had the lowest mean positive attitude score ($M = 3.22$), and first-year students had the lowest mean negative attitude score ($M = 2.21$) (Table 1).

3.2. Reliability and Validity. A CFA was conducted to validate the study scales. Initially, the Kaiser–Meyer–Olkin (KMO) measure and the Bartlett test of sphericity assessed the suitability of the sample. A KMO measure should ideally exceed 0.60, while the Bartlett test of sphericity ought to be statistically significant at $P < 0.05$. The findings showcased KMO values of 0.861 ($P < 0.001$) for the scale assessing personality traits and 0.953 ($P < 0.001$) for the scale measuring attitudes toward AI. Factor loadings for all scale items surpassed the benchmark of 0.5 [38], corroborating the scales' construct validity. In addition, all average variance extracted (AVE) exceeded the 0.50 benchmark for the study variables, signifying adherence to convergent validity. The AVE values were observed to be greater than the maximum shared variance (MSV), thus reinforcing the discriminant validity of the research model [39] (Table 2).

Reliability was further scrutinized using Cronbach's alphas and composite reliability (CR). Study results revealed Cronbach's alpha values spanning from 0.89 to 0.92 for all scale factors, exceeding the 0.7 threshold [40], implying robust internal consistency. Additionally, CR values ranged between 0.89 and 0.93 for all study scale factors, all surpassing the 0.70 threshold [41], underscoring the scales' elevated reliability (Table 2).

3.3. Descriptive Statistics. As presented in Table 2, the personality traits of the nursing students who contributed in this study ranked as follows: "conscientiousness" ($M = 3.18$, $SD = 0.75$), "openness" ($M = 3.10$, $SD = 0.75$), "agreeableness" ($M = 2.90$, $SD = 0.77$), "extraversion" ($M = 2.67$, $SD = 0.81$), and "neuroticism" ($M = 2.18$, $SD = 0.68$). The participating nursing students exhibited a more positive attitude toward AI ($M = 3.37$, $SD = 0.81$) compared to a negative attitude toward AI ($M = 2.39$, $SD = 0.79$).

3.4. Correlations. Table 3 presents the results of the Pearson correlation analysis. It indicates that the positive attitude toward AI significantly and positively correlates with the openness personality trait ($r = 0.499$, $P < 0.001$) and negatively correlates with both the agreeableness ($r = -0.153$, $P = 0.024$) and neuroticism ($r = -0.142$, $P = 0.036$) personality traits. Additionally, the results revealed a significant positive correlation between negative attitude toward AI and agreeableness ($r = 0.488$, $P < 0.001$), conscientiousness ($r = 0.316$, $P < 0.001$), and neuroticism ($r = 0.319$, $P < 0.001$) personality traits.

3.5. Stepwise Multiple Regression Analysis of Attitude toward AI. A stepwise multiple regression investigation was done to explore how nursing students' attitudes toward AI, either

TABLE 1: Students' demographics and differences in attitude toward AI ($N=218$).

Characteristics	Category	No.	%	Positive		Negative	
				M (SD)	t/F (P)	M (SD)	t/F (P)
Age (years)	<20	97	44.5	3.38 (0.78)	$t=0.19$ (0.85)	2.39 (0.74)	$t=0.09$ (0.92)
	≥ 20	121	55.5	3.36 (0.83)		2.38 (0.82)	
Gender	Male	40	18.3	3.21 (0.80)	$t=-1.41$ (0.17)	2.45 (0.88)	$t=0.52$ (0.60)
	Female	178	81.7	3.40 (0.81)		2.37 (0.77)	
Marital status	Married	26	11.9	3.40 (0.81)	$t=0.23$ (0.82)	2.32 (0.69)	$t=-0.50$ (0.62)
	Unmarried	192	88.1	3.36 (0.81)		2.39 (0.80)	
Educational level	1 st year	41	18.8	3.36 (0.75)	$F=1.31$ (0.269)	2.21 (0.66)	$F=1.39$ (0.237)
	2 nd year	36	16.5	3.62 (0.77)		2.31 (0.73)	
	3 rd year	40	18.4	3.33 (0.84)		2.61 (0.87)	
	4 th year	56	25.7	3.36 (0.83)		2.40 (0.83)	
	Intern	45	20.6	3.22 (0.80)		2.39 (0.79)	

M : mean; SD : standard deviation; t : independent-samples t -test; F : ANOVA test of variance; P : level of significance.

TABLE 2: Reliability, validity, and descriptive statistics ($N=218$).

Variable	α	Factor loading	CR	AVE	MSV	Mean \pm SD
Personality traits						
Extraversion	0.89	0.66–0.79	0.89	0.51	0.01	2.67 \pm 0.81
Agreeableness	0.92	0.71–0.81	0.92	0.57	0.16	2.90 \pm 0.77
Conscientiousness	0.90	0.68–0.75	0.90	0.51	0.13	3.18 \pm 0.75
Neuroticism	0.90	0.63–0.78	0.90	0.53	0.16	2.18 \pm 0.68
Openness	0.91	0.68–0.75	0.91	0.51	0.03	3.10 \pm 0.75
Attitude toward AI						
Positive attitude toward AI	0.92	0.65–0.79	0.93	0.51	0.52	3.37 \pm 0.81
Negative attitude toward AI	0.92	0.71–0.83	0.92	0.59	0.52	2.39 \pm 0.79

AI: artificial intelligence; α : Cronbach's alpha; CR: composite reliability; AVE: average variance extracted; MSV: maximum shared variance; SD: standard deviation.

TABLE 3: Correlation analysis of personality traits and attitude toward AI ($N=218$).

Personality traits	Attitude toward AI	
	Positive	Negative
Extraversion	r	-0.002
	p	0.974
Agreeableness	r	-0.153
	p	0.024
Conscientiousness	r	-0.028
	p	0.684
Neuroticism	r	-0.142
	p	0.036
Openness	r	0.499
	p	<0.001

AI: artificial intelligence; r : Pearson's correlation; p : level of significance.

positive or negative, as the dependent variable, correlated with personality traits that showed statistical significance in Pearson's correlation analysis as independent variables. Sociodemographic factors were not included in the regression model since they did not show any significant impact on the attitudes toward AI (as detailed in Table 1).

The analysis found no multicollinearity issues; for positive attitudes, the tolerance values were between 0.86 and 0.97 (above 0.1), and the variance inflation factors (VIFs) were between 1.04 and 1.17 (below 3). Similarly, for negative attitudes, tolerance values ranged from 0.78 to 0.89 (above 0.1), and VIF values ranged from 1.12 to 1.28 (below 3).

In the regression analysis predicting positive attitudes toward AI, the results indicated that high openness ($\beta = 0.499$, $P < 0.001$), low neuroticism ($\beta = -0.178$, $P = 0.005$), and low agreeableness traits ($\beta = -0.175$, $P = 0.019$) were significant predictors of positive attitudes toward AI. The model accounted for 27.2% of the variance in nursing students' attitudes toward AI (Table 4).

In the regression analysis predicting negative attitudes toward AI, the results displayed that agreeableness ($\beta = 0.372$, $P < 0.001$), conscientiousness ($\beta = 0.172$, $P = 0.005$), and neuroticism ($\beta = 0.160$, $P = 0.011$) were significant predictors of negative attitudes toward AI. The model accounted for 28.7% of the variance in nursing students' negative attitudes toward AI (Table 5).

4. Discussion

This study examined the relationship between nursing students' personality traits and their attitudes toward artificial intelligence (AI), focusing specifically on a Saudi Arabian context. While there have been studies examining healthcare professionals' attitudes toward AI, limited research has focused on nursing students in Saudi Arabia. This study aimed to fill that gap by exploring how personality traits, as categorized by the Big Five framework, influence attitudes toward AI.

The study findings indicated no statistically significant difference in the students' attitudes toward AI, either positive or negative, while taking into account the demographic characteristics of the students. Previous studies have suggested that cultural factors can influence attitudes toward technology, supporting the idea that a similar cultural background may lead to consistent attitudes [11, 18, 20]. This lack of difference could be attributed to the homogeneous cultural background of the participants. Saudi Arabian nursing students may share similar cultural values and educational experiences, which could result in comparable attitudes toward AI. However, there is limited direct evidence linking similar cultures as predictors of attitudes toward AI. Other possible explanatory factors include varying levels of exposure to AI technologies and differences in educational curricula, which can significantly impact attitudes. Further research in diverse cultural settings is needed to fully understand the cross-cultural differences in attitudes toward AI.

4.1. Personality Traits and Attitudes toward AI. Overall, the findings conclude that the Big Five personality traits—openness to new experiences, agreeableness, neuroticism, and conscientiousness—all tend to predict attitudes toward artificial intelligence, whether they are positive or negative, with the exception of extraversion: nursing students who scored highly on the openness trait had positive attitude toward AI; in contrast, those with high neuroticism and agreeableness scores showed more negative than positive attitudes toward AI; moreover, conscientiousness-scoring nursing students had negative attitudes toward artificial

intelligence. Thus, the findings of the study align with recent studies that found personality traits, to typically have a substantial effect on people's attitudes toward AI [8, 15, 18, 19, 42].

4.1.1. Openness. The findings are in line with other authors who contend that people who score highly on openness to experience are more likely to be flexible, curious, respectful of innovation, and open to new technologies—all of which are indicators of positive attitudes toward artificial intelligence. This supports existing knowledge that openness is associated with positive perceptions of technology [13, 19].

4.1.2. Agreeableness. However, the results of our study are consistent with suggestions that agreeableness was a significant predictor of people's negative attitudes toward AI [13, 43, 44]. Likewise, recent studies discovered no significant relationship between agreeableness and positive attitudes toward AI [19, 44]. In an explanation of such results, studies argued that people with higher agreeableness scores—such as etiquette, social skills, and willingness to compromise nature—might be more able to withstand the negative effects of AI [13, 43–45].

4.1.3. Conscientiousness. In the current study, nursing students who ranked high in conscientiousness showed a negative attitude toward artificial intelligence. However, a research study stated that conscientiousness did not significantly predict positive or negative attitudes toward AI; nevertheless, it showed a weak but significant positive correlation with negative attitudes [13, 46, 47]. However, those who are highly conscientious may have a more positive opinion of AI since they place great importance on organization, efficiency, and observing regulations. These individuals may also see AI as a tool to boost efficiency and production as they understand the importance of aptitude, efficacy, and organization [19]. This highlights a mixed understanding of how conscientiousness influences AI attitudes, suggesting further investigation is needed.

4.1.4. Neuroticism. The findings of our study showed that those who scored high in neuroticism exhibited more negative than positive attitudes toward artificial intelligence. Similarly, another study indicated that those who score highly on the neuroticism trait are more likely to be skeptical, fearful, and anxious, about the potential risks and implications of AI and consequently have negative attitudes toward artificial intelligence [19]. They may see AI as a threat rather than a helpful tool. The idea of machines mimicking human capabilities and potentially taking over tasks that were traditionally performed by humans may trigger feelings of insecurity and unease for these individuals. Their fear of AI replacing human jobs and potentially causing unemployment can further contribute to their negative attitudes [42, 48].

TABLE 4: Results of a multiple stepwise linear regression analysis predicting positive attitude toward AI of the studied nursing students ($N = 218$).

Predictors	B	SE (B)	β	T	P value	95% CI
Constant	2.623	0.260	—	10.075	<0.001	2.11–3.14
Openness	0.538	0.064	0.499	8.408	<0.001	0.412–0.664
Agreeableness	-0.186	0.066	-0.178	-2.822	0.005	-0.317–0.056
Neuroticism	-0.175	0.074	-0.149	-2.359	0.019	-0.322–0.029

B : unstandardized regression coefficient; SE: standard error; β : standardized regression coefficient; T : T -statistic; P : level of significance; 95% CI: 95% confidence interval; R (multiple correlation coefficient): 0.522; R^2 (coefficient of determination): 0.272; ΔR^2 (change in R^2): 0.262; F (F -statistic): 26.695; $P < 0.001$.

TABLE 5: Results of a stepwise multiple linear regression analysis predicting negative attitude toward AI of the studied nursing students ($N = 218$).

Predictors	B	SE (B)	β	T	P value	95% CI
Constant	0.302	0.245	—	1.231	0.220	-0.181–0.785
Agreeableness	0.381	0.067	0.372	5.701	<0.001	0.249–0.512
Conscientiousness	0.181	0.064	0.172	2.816	0.005	0.054–0.308
Neuroticism	0.185	0.072	0.160	2.581	0.011	0.044–0.326

B : unstandardized regression coefficient; SE: standard error; β : standardized regression coefficient; T : T -statistic; P : level of significance; 95% CI: 95% confidence interval; R (multiple correlation coefficient): 0.536; R^2 (coefficient of determination): 0.287; ΔR^2 (change in R^2): 0.277; F (F -statistic): 28.719; $P < 0.001$.

4.1.5. Extraversion. Although extraversion is a personality characteristic that may predict attitudes toward AI generally [44], our study indicates that extraversion is not a significant predictor of favorable or negative attitudes toward AI for Saudi Arabian nursing students involved in our sample. These results seem to be in line with studies that showed extroversion not to be a significant predictor of attitudes toward artificial intelligence, either positive or negative [13, 19, 46]. One possible explanation is that students come from a cultural background where solidarity and social harmony are valued more highly than individuality. This might lead to less extraversion and a more cautious approach toward artificial intelligence [49]. This may suggest that extraversion may not be a strong predictor of attitudes toward artificial intelligence in this specific population. Conversely, Schepman [44] showed a negative correlation between extroversion and attitudes toward AI, suggesting that introversion traits increase positive attitudes toward AI [44].

One possible explanation of the results of our study could be the cultural context in Saudi Arabia. In cultures where collectivism and conformity are emphasized, individual personality traits such as extraversion may have a diminished influence on attitudes toward technology. However, because artificial intelligence is still an evolving and complex area, nursing students may have varying degrees of exposure to and awareness of its potential benefits and implications for their field of work.

4.2. Implications of the Study. Given the paucity of research on the personality traits and attitudes of Saudi Arabian nursing students toward artificial intelligence, the current study is crucial for examining the attitudes of these students

and their preparedness to adopt AI in the field of nursing. Understanding the viewpoints and experiences of nursing students is imperative to address the scarcity of nurses, advance nursing, and improve patient outcomes.

Focusing on Saudi Arabia provides valuable insights into how cultural and educational contexts influence the acceptance of AI among future nurses. This information can help tailor AI healthcare systems to better align with the preferences and mindsets of their users, leading to more effective and efficient integration of AI in nursing practices. By doing so, we can enhance the efficiency of nursing workflows, reduce the burden on nurses, and potentially attract more individuals to the profession.

Moreover, improving the readiness of nursing students to adopt AI can lead to better patient outcomes by ensuring that future nurses are well equipped to utilize AI technologies in patient care. AI can assist in tasks such as patient monitoring, diagnostics, and personalized care plans, which can improve the quality of care provided. By understanding and addressing the specific attitudes and personality traits of Saudi Arabian nursing students, we can develop targeted educational strategies and interventions that foster a positive attitude toward AI, ultimately benefiting both nurses and patients.

To guide future strategies for promoting and applying AI in nursing, our findings suggest the need for targeted educational interventions that consider the diverse personality traits of nursing students. Training programs should emphasize the benefits and practical applications of AI in nursing to alleviate fears and resistance, particularly among those with high neuroticism and conscientiousness. Additionally, integrating AI-related content into nursing curricula can help build familiarity and competence, paving the

way for smoother adoption and utilization of AI technologies in healthcare settings. These strategies can contribute to a more prepared and adaptable nursing workforce, capable of leveraging AI to improve patient outcomes and address the ongoing challenges in the healthcare sector.

4.3. Limitations. There are some limitations to the research. The initial multicenter, cross-sectional research methodology of this study made it harder to build a causal relationship between the identified factors and nurses' knowledge and attitudes toward artificial intelligence. A long-term study on the personality traits of nursing students is recommended in order to have a more comprehensive understanding of the students' traits throughout various points in time of their lives and in relation to various clinical and professional concerns. Second, there is a greater chance of source/response bias because self-reported measures were employed to collect the data simultaneously and using the same method: online. Future studies should consider using a variety of data sources, such as focused groups and individual interviews, in order to preserve objectivity.

Third, depending on their personality traits, some students showed a more positive attitude toward AI than others, while others showed a more tendency toward negative ones. The negative attitudes might be a result of a variety of complex aspects such as worries that artificial intelligence (AI) could outsmart humans, create moral/ethical dilemmas, or lead to loss of jobs. Therefore, it is crucial to take into account the social and cultural elements that can affect Saudi Arabians' attitudes toward artificial intelligence. Fourth, although the study was multicentered, it was limited to a specific sample of Saudi Arabian nursing students, which may have limited the findings' generalizability and application to other populations of nursing students or healthcare settings. It would be helpful to replicate this study with greater and more varied samples to confirm rigor and generalizability.

Another limitation is that while the study assessed nursing students' attitudes toward AI integration, it did not evaluate the possible actual incorporation of AI technology in their educational practices. Upcoming research could discover the real operation of AI tools by nursing students and evaluate its influence on their learning consequences and clinical training. Overall, these limitations highlight areas where improvements can be made in future studies to enhance our understanding of personality traits and attitudes toward AI among Saudi Arabian nursing students.

5. Conclusion

Artificial intelligence is developing swiftly and is already showing up in a number of health-related fields, including nursing. To properly integrate this technology into the nursing profession, it is therefore imperative to comprehend the elements that influence attitudes toward it. Overall, it appears that personality traits can influence individuals' attitudes toward AI, with certain traits being more closely related to positive or negative attitudes. Given the dearth of

research on Saudi Arabian nursing students, the study's findings provide important insights into the personality traits and attitudes of Saudi Arabian nursing students toward artificial intelligence. The findings show that personality traits, except for extraversion, are often predictive of attitudes toward artificial intelligence whether positive or negative. The findings indicated that nursing students' positive attitudes toward artificial intelligence were strongly correlated with their openness to new experiences. Conversely, those whose personality traits scored highly on agreeableness and neuroticism were more likely to have negative than positive attitudes toward AI. Furthermore, conscientious nursing students have a negative attitude toward artificial intelligence.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

GS and MAZ planned the study and made substantial contributions to the conception and design, or acquisition of data, or analysis and interpretation of data. HEE, GS, MAZ, and AM were major contributors in writing and drafting the manuscript. GS and HEE were major contributors in writing the Discussion section. TA collected the manuscript and made the final revision. All authors have given final approval of the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Research Article

Nursing Workload Prediction for Upcoming Shifts: A Retrospective Observational Exploratory Study in the Postoperative and Intensive Care Unit

Ann-Margret Hasselgård ^{1,2} Siv K. Stafseth ^{2,3} and Øyvind Kirkevold ^{4,5,6}

¹Postoperative/Intensive Care Unit, Diakonhjemmet Hospital, Oslo, Norway

²Lovisenberg Diaconal University College, Oslo, Norway

³Centre for Patient Centered Heart and Lung Research, Department of Cardiothoracic Surgery, Oslo University Hospital, Oslo, Norway

⁴The Norwegian National Centre for Ageing and Health, Vestfold Hospital Trust, Tønsberg, Norway

⁵Research Center for Age-Related Functional Decline and Disease (AFS), Innlandet Hospital Trust, Brumunddal, Norway

⁶Norwegian University of Science and Technology (NTNU), Department of Health Sciences in Gjøvik, Trondheim, Norway

Correspondence should be addressed to Ann-Margret Hasselgård; ann-margret.hasselgard.jacobsen@ldh.no

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Aims. This study aimed to explore workload whether Nursing Activities Scores on one shift could predict workload for the next shift. **Method.** This was a retrospective observational exploratory study of cross-sectional design carried out in a postoperative and intensive care unit at a local, nonprofit hospital in Norway. Data were collected from the hospital's internal database from January 1st to June 30th, 2016. **Results.** A total of 2,695 patients and 5,916 Nursing Activities Scores were included. The model could predict a 55.1% to 66.9% variation in Nursing Activities Scores for the next shift. When the number of patients was added, the model explained up to 80% of the variation. **Conclusions.** The Nursing Activities Score can be used to predict nursing workload from one shift to another and as an instrument for managers to adjust their staffing requirements. **Implications for Nursing Management.** Nursing Activities Score assessing nursing workload for all patients in a unit can support the resource planning with accuracy for nurse staffing.

1. Background

The mix and size of nursing teams have implications for patient safety, quality of work, nurses' well-being, and the cost of patient care. There is increasing pressure on health expenditure, and several international studies have described resource planning in medical and surgical intensive care units (ICUs) [1–3]. There have also been studies on workload on postoperative and medium care units [4–6]. A review of 26 studies from ICUs found an association between the patient-per-nurse ratio and adverse events such as infections, postoperative complications, unplanned extubations, and burnout syndrome in nurses [7]. A study from 15 Dutch ICUs found that ICU mortality was associated with the nursing workload [8]. Other studies have

found that nursing workload is influenced by patient and nurse characteristics [9, 10], and that nursing workload and perceived workload are related [11].

In many postoperative units/ICUs, patient-per-nurse ratios are fixed per shift. However, the association between patient-per-nurse ratios and workload per patient has been found to be weak [8]. Therefore, using workload in one shift to predict workload in the next shift could be a better way for leaders to prioritize resources. Decock et al. [12] investigated whether nurse-level intensity within an intensity group of patients could predict nurse-level intensity on the next shift and on the same shift the next day [12]. The study divided patients into three categories (i.e., levels of lower, median, and high intensity) and could predict 69.7%–74.0% of workload within the categories.

A reliable and validated instrument can help managers prioritize resources to guide resource planning in the short and long term. The Nursing Activities Score (NAS) is a classification instrument used worldwide in medical and surgical ICUs [13]. The instrument was designed to monitor nursing workload per patient per day and shift in order to plan short- and long-term staffing [1, 12, 14]. The NAS consists of 23 different activities that measure direct and indirect ICU patient care, and the instrument has been validated to calculate 81% of actual nursing time. The items were defined by work sampling, and the score represents the calculated percentage of time one nurse spends on each item. A total score of 100% was defined as equal full-time work for one nurse per shift. However, studies have found that one nurse can manage 61–90% of NAS [15] and that certified intensive care nurses manage a higher workload than registered nurses [9]. Several electronic applications are used to find the operational characteristics of the NAS both in the short and long term [16]. Our study can support the idea of an application using NAS as an active tool in planning resources on a shift-to-shift-basis.

Nursing workload can be used as a factor in nurse staffing, and we suggest considering all short stays in a unit in calculating the workload. Monitoring, hygiene procedures, support and care of patients, and administrative and discharge duties are all part of nursing activities for all patients regardless length of stay, and nurse encounters are time consuming in postoperative units/ICUs. The aims of our study were to explore whether the NAS of one shift could predict the NAS of the next shift and to investigate whether the scores were influenced by patient sex, age, ward, type of admission, and the number of patients.

2. Methods

2.1. Design and Setting. This retrospective, observational, exploratory study was conducted at the postoperative and ICU at a local hospital in the eastern part of Norway. The hospital provides general services within fields such as internal medicine, surgery, and mental health for 145,000 people. The facility is also responsible for treating older people with hip fractures from a larger area. The postoperative unit/ICU is a 19-bed unit that provides invasive and noninvasive respiratory care, invasive hemodynamic monitoring with an arterial catheter, pulse-induced continuous cardiac output, administration of vasoactive and inotropic medications, and continuous dialysis replacement. The unit admits patients from the emergency room, medical and surgical wards, and the operation theater. The postoperative unit/ICU support the outpatient ward when they have 100% bed occupancy and after closing at night. Medical outpatients who receive electrical cardioversion are treated in the postoperative unit/ICU. The nursing staff consists of 50% registered nurses (RNs) with a bachelor's degree and 50% specialized nurses, some with a master's degree. Specialized nurses have a 1.5-year full-time postgraduate education in critical care nursing, nurse anesthetist, or 1-year full-time postgraduate education in cardiac nursing. Anesthesiologists and medical doctors are responsible for

medical treatment. During the daytime, a secretary takes care of administrative paperwork and calls, and a technical assistant is responsible for equipment maintenance, storage, and cleaning. The nurse-per-patient ratio varies from 1 : 3 for postoperative patients to 1 : 1 for ICU patients and 2 : 1 for demanding patients. The unit has more nurses during day shifts on weekdays than on other shifts and weekends. Staffing is flexible, and the manager can adjust for the next shift whenever there is a need for more or fewer nurses.

2.2. Sample. Data were collected from an internal database in the hospital's administrative system, anonymized, and transferred to a separate file for statistical analysis. The study period was from January 1 to June 30, 2016, and included 2,695 patients and 5,916 scores of NAS over 182 days. The study included all patients admitted to the unit during this period.

2.3. Variables. Study variables included patient age, sex, ward (medical or surgical), type of admission (elective or emergency), type of surgery (gastro surgical, orthopedic, or nonsurgical patients), length of stay in the postoperative unit/ICU, patients per day, and shift (Table 1). The median NAS scored per patient for each shift is presented in Table 2.

2.4. Procedure Description. The validity and reliability of NAS has been tested in several Norwegian postoperative units and ICUs [5, 15, 17, 18]. From 2014, nurses at our postoperative/ICU scored the Nursing Activities Score on all patients admitted to the hospital. Before its introduction in 2014, nurses had been educated in using the instrument and subsequently undertook an updated course every year. Nurses responsible for the patient care collected the NAS on paper, and the secretary plotted all the data into an internal database. Data were checked for quality by the first author.

The scores of NAS were measured in three 8 hour (h) shifts per 24 h. Night shift began from midnight until 08:00, day shift from 08:00 to 16:00, and evening shift from 16:00 to midnight. For patients with a short length of stay of <8 h, the database was designed to calculate the shift and 24 h scores according to the time the patient stayed in the unit. For example, if a patient had a 50% NAS and stayed only 3 h, then the shift score would be 18.75% NAS, and the 24 h score would be 6.25% NAS for that patient. This aligns with the results of another study [5]. By including length of stay in NAS, a patient with a high workload and short length of stay could get a low NAS score, and a patient with a low workload and a long length of stay get a relatively high NAS.

2.5. Statistical Analysis. The data were analyzed using IBM SPSS Statistics version 25.0. Categorical variables were reported as absolute and relative frequencies and analyzed using the Chi-square or Kruskal–Wallis tests as appropriate. Continuous variables were reported as mean and standard deviation (SD) or median as appropriate. Differences between groups were analyzed with Student's *t*-test or

TABLE 1: Sociodemographic description of number of patients, age, sex, type of admission, type of surgery, length of stay in hours, number of days, and number of patients per day and shift.

		Medical patients	Surgical patients	<i>p</i>
Patients, number (%)		2695	2082 (77.3)	
Age, mean (SD) [†]		63.2 (18.9)	64.2 (18.3)	<0.001 [§]
Sex, number (%)				
	Male	1257 (46.6)	869 (69.1)	
	Female	1438 (53.4)	1213 (84.4)	<0.001 [§]
Type of admission, number (%)				
	Elective	1047 (38.8)	973 (92.9)	
	Emergency	1648 (61.2)	1109 (67.2)	<0.001 [§]
Type of surgery, number (%)				
	Gastrosurgical		635 (30.5)	
	Orthopedic		1300 (62.4)	
	Nonoperated		147 (7.1)	
Length of stay hours PO/ICU ^{**} median (Q1–Q3 [‡])		3.4 (2.1–6.3)	7.2 (2.0–19.8)	<0.001 ^{††}
Number of days		182		
Patients per day and shift, mean (SD) [†]				
	Total	20.2 (6.7)		
	Night shift	6.6 (2.3)		
	Day shift	13.9 (5.4)		
	Evening shift	12.0 (4.2)		

[†] = SD-standard deviation, [‡] = Q1–Q3-interpercentile range, [§] = Student's *T*-test, [¶] = Chi-square, ^{††} = Mann–Whitney *U*, ^{**} = PO/ICU-postoperative/intensive care unit. *p* value <0.05 indicates statistical significance.

Mann–Whitney *U* test. Furthermore, univariable and multivariable linear regression models were used to investigate whether there was an association between the NAS and individual data.

To explore whether the NAS on one shift could predict the NAS on the next shift, the data were aggregated by day. Patient characteristics were also aggregated and included to investigate whether there was an association between the characteristics and the aggregated NAS. In the aggregated material, the NAS and number of patients were summed, and the average ages were determined. The gender, ward, and type of admission were calculated as an average between 0 and 1, indicating the percentages. To explore the extent to which NAS-night shift could predict NAS-day shift, NAS-day shift was set as the dependent variable and NAS-night shift as the independent variable in the regression analysis. To investigate whether NAS-day shift was associated with patient characteristics, the characteristics of day shifts were included in the model. The same method was used to investigate whether the NAS-day shift could predict the NAS-evening shift and to what extent patient characteristics on the evening shift were associated with NAS. In all analyses, a *p* value <0.05 indicate statistical significance.

2.6. Ethical Approval. Ethical standards and regulations were followed. In each case, observations were measured and entered in an electronic system, which recorded and displayed results. The need to require informed consent from patients was waived, and data were anonymized prior to transfer to the research team. The study was approved by the local data protection officer of the hospital on the 4th of July 2018 with case number 18/11020. The decision ruled out bioethics committee.

3. Results

3.1. Patient Characteristics. Demographic and clinical characteristics of participants are presented in Table 1. Most patients were admitted to the emergency department (61.2%) and surgically treated (77.3%). The length of stay varied from 10 min to 23 days, and 62.7% of the surgical and 40.6% of the medical patients stayed in the unit for less than 4 h (not shown). The NAS per shift is described by sex, ward, type of admission, and type of surgery in Table 2. The patients on night shift had the highest NAS with a median of 55.7%. Patients on evening shift had 21.6%, and patients on day shift a median of 19.6% NAS.

3.2. Association between NAS Shift Scores and Individual Patient Data. Ward ($\beta = -0.33$, $p < 0.001$) and type of admission ($\beta = 0.33$, $p < 0.001$) had the strongest association with NAS-day shift as the dependent variable in the univariable linear regression on individual data in Table 3. The multivariate model explained 17.4% of the variation in the NAS-day shift. This was also observed with the NAS-evening shift as the dependent variables (ward $\beta = -0.40$, $p < 0.001$ and type of admission $\beta = 0.25$, $p < 0.001$), and the multivariate model could explain 19.3% of the variation in NAS-evening shift.

3.3. Association between NAS Shift Scores and Aggregated Data. Table 4 shows that NAS-nightshift ($\beta = 0.74$, $p < 0.001$) and the proportion of emergency patients during the day shift ($\beta = -0.39$, $p < 0.001$) had the strongest association with NAS-day shift as dependent variables on aggregated data in univariable linear regression. The model could explain 73.1% of the variation in NAS-day shift in multivariate linear

TABLE 2: Nursing activities scores per patient per shift (night, day, and evening) described by sex, ward, type of admission, and type of surgery.

Categories and variables	NAS [†] -night shift			NAS [†] -day shift			NAS [†] -evening shift		
	n [‡] (%)	Median (Q1–Q3 [§])	p	n [‡] (%)	Median (Q1–Q3 [§])	p	n [‡] (%)	Median (Q1–Q3 [§])	p
NAS [†] per patient per shift	1204	55.7 (26.1–73.1)		2521	19.6 (8.7–49.1)		2191	21.6 (9.6–58.3)	
<i>Sex</i>									
Male	673 (55.9)	58.1 (30.9–78.0)		1276 (50.6)	22.7 (8.8–61.8)		1074 (49.0)	27.1 (10.7–68.8)	
Female	531 (44.1)	51.4 (20.8–68.6)	<0.001 [*]	1245 (49.4)	17.9 (8.6–37.2)	<0.001 [*]	1117 (51.0)	18.6 (8.9–44.7)	<0.001 [*]
<i>Ward</i>									
Medical	606 (50.3)	60.1 (41.6–80.7)		859 (34.1)	40.7 (15.1–74.2)		610 (27.8)	59.3 (23.3–86.2)	
Surgical	598 (49.7)	46.3 (14.6–65.6)	<0.001 [*]	1662 (65.9)	15.7 (7.3–30.6)	<0.001 [*]	1581 (72.2)	16.6 (8.4–36.3)	<0.001 [*]
<i>Type of admission</i>									
Emergency	1123 (93.3)	55.5 (26.2–74.1)		1535 (60.9)	28.9 (9.9–68.3)		1561 (71.2)	27.5 (10.9–67.9)	
Elective	81 (6.7)	56.0 (10.6–67.1)	0.313 [*]	986 (39.1)	14.3 (7.5–25.1)	<0.001 [*]	630 (28.8)	14.6 (7.0–30.0)	<0.001 [*]
<i>Surgical</i>									
Gastrointestinal	263 (43.9)	58.2 (19.4–70.7)		564 (33.9)	14.9 (7.2–48.3)		540 (34.2)	17.7 (8.4–57.7)	
Orthopedic	229 (38.3)	25.1 (9.6–51.9)		940 (56.6)	15.3 (7.4–24.8)		903 (57.1)	15.3 (8.6–27.4)	
Nonoperated	106 (17.8)	56.2 (36.6–83.9)	<0.001 ^{††}	158 (9.5)	31.8 (7.2–69.6)	<0.001 ^{††}	138 (8.7)	42.3 (8.2–81.3)	<0.001 ^{††}

† = NAS-nursing activities score, ‡ = n-number of NAS per shift, § = Q1–Q3-interpercentile range, * = Mann–Whitney U, †† = Kruskal–Wallis test, p value <0.05 indicates statistical significance.

TABLE 3: Linear regression by individual data with NAS-day shift and NAS-night shift as dependent variables.

NAS-day shift as a dependent variable	Univariable linear regression					Multivariable linear regression					
	B (95% CI)	β	<i>p</i>	<i>r</i> ²	B (95% CI)	β	<i>p</i>	<i>r</i> ²	B (95% CI)	β	Adjusted <i>R</i> ² = 0.174
Age, day	0.12 (0.05, 0.19)	0.07	<0.001	0.005	0.17 (0.11, 0.23)	0.10	<0.001				
Sex, day (men 0, women 1)	-8.76 (-11.30, -6.23)	-0.13	<0.001	0.018	-5.34 (-7.73, -2.96)	-0.08	<0.001				
Ward, day (medical 0, surgical 1)	-23.39 (-26.03, -20.74)	-0.33	<0.001	0.107	-17.13 (-19.87, -14.38)	-0.24	<0.001				
Type of admission, day (elective 0, emergency 1)	23.34 (20.71, 25.96)	0.33	<0.001	0.108	17.16 (14.48, 19.84)	0.24	<0.001				
NAS-evening shift as a dependent variable	Univariable linear regression					Multivariable linear regression					
	B (95% CI)	β	<i>p</i>	<i>r</i> ²	B (95% CI)	β	<i>p</i>	<i>r</i> ²	B (95% CI)	β	Adjusted <i>R</i> ² = 0.193
Age, day	0.14 (0.07, 0.22)	0.08	<0.001	0.007	0.22 (0.15, 0.28)	0.12	<0.001				
Sex, day (men 0, women 1)	-10.92 (-13.65, -8.19)	-0.17	<0.001	0.027	-6.97 (-9.52, -4.42)	-0.11	<0.001				
Ward, day (medical 0, surgical 1)	-28.65 (-31.43, -25.87)	-0.40	<0.001	0.157	-25.06 (-27.99, -22.12)	-0.35	<0.001				
Type of admission, day (elective 0, emergency 1)	17.61 (14.70, 20.53)	0.25	<0.001	0.060	8.66 (5.79, 11.52)	0.12	<0.001				

NAS, nursing activities score; B, unstandardized regression coefficient; CI, confidence interval; β , standardized regression coefficient; *p* value <0.05 indicates statistical significance.

TABLE 4: Linear regression on aggregated data with NAS-day shift and NAS-evening shift as dependent variables and NAS-night shift, NAS-day shift, and demographic characteristics as independent variables.

NAS-day shift as dependent variable	Univariable linear regression				Multivariable linear regression				
	B (95% CI)	β	<i>p</i>	<i>r</i> ²	B (95% CI)	β	<i>p</i>	Adjusted <i>R</i> ² = 0.731	
NAS-night shift	0.94 (0.82, 1.07)	0.74	<0.001	0.551	0.97 (0.87, 1.06)	0.76	<0.001		
Age mean, day	-1.11 (-5.59, 3.37)	-0.04	0.625	0.001	1.11 (-1.26, 3.48)	0.04	0.357		
Proportion of women, day	-0.60 (-2.24, 1.04)	-0.05	0.471	0.003	-0.28 (-1.18, 0.63)	-0.03	0.548		
Proportion of surgical patients, day	1.52 (0.14, 2.91)	0.16	0.031	0.026	-0.41 (-1.41, 0.59)	-0.04	0.424		
Proportion of emergency patients, day	-2.81 (-3.79, -1.82)	-0.39	<0.001	0.150	-3.40 (-4.15, -2.65)	-0.47	<0.001		
NAS-evening shift as dependent variable		Univariable linear regression				Multivariable linear regression			
		B (95% CI)	β	<i>p</i>	<i>r</i> ²	B (95% CI)	β	<i>p</i>	Adjusted <i>R</i> ² = 0.663
NAS-day shift		0.84 (0.75, 0.92)	0.82	<0.001	0.669	0.84 (0.74, 0.94)	0.82	<0.001	
Age mean, evening		0.61 (-3.07, 4.29)	0.02	0.744	0.001	0.88 (-1.32, 3.08)	0.04	0.429	
Proportion of women, evening		-1.03 (-2.47, 0.42)	-0.10	0.164	0.011	-0.34 (-1.23, 0.55)	-0.04	0.448	
Proportion of surgical patients, evening		0.57 (-0.94, 2.08)	0.06	0.457	0.003	0.04 (-1.05, 1.12)	0.003	0.949	
Proportion of emergency patients, evening		-2.97 (-4.26, -1.68)	-0.32	<0.001	0.103	0.10 (-0.94, 1.13)	0.01	0.855	

NAS, Nursing Activities Score; B, unstandardized regression coefficient; CI, confidence interval; β , standardized regression coefficient; *p* value <0.05 indicates statistical significance.

regression. NAS-night shift and NAS-day shift had a correlation coefficient of 0.74 (not shown), and NAS-night shift could explain 55.1% of the variation in NAS-day shift, Figure 1.

The NAS-day shift had the strongest association with the NAS-evening shift ($\beta = 0.82$, $p < 0.001$) and the proportion of emergency patients in the evening shift ($\beta = -0.32$, $p < 0.001$). In multivariate linear regression, the model explained 66.3% of the variation in the NAS-day shift. The NAS-day and evening shifts had a correlation coefficient of 0.82 (not shown), and the NAS-day shift could explain 66.9% of the variation in the NAS-evening shift, Figure 1.

We postulated that NAS shift scores were associated with the number of patients undergoing the shift. With the NAS-day shift as the dependent variable and the NAS-night shift and the number of patients during the day shift as independent variables, multivariate linear regression explained 80.7% of the variation in the NAS-day shift (not shown). If NAS increased by 1% on the night shift, the NAS-day shift increased by 0.8%. For every admitted patient during the day shift, NAS increased by 16.4%. The correlation coefficient between the NAS-day shift and the number of patients on the day shift was 0.70. The same was done with the NAS-evening shift as the dependent variable and the NAS-day shift and number of patients on the evening shift as independent variables. Multivariate linear regression explained 70.4% of the variation in the NAS-evening shift. If NAS increased by 1% on the day shift, the NAS-evening shift would increase by 0.7%. For every patient admitted during the evening shift, the NAS increased by 10.8%. The correlation coefficient between the NAS-evening shift and the number of patients on evening shift was 0.70 (not shown).

4. Discussion

This study found a strong association between the NAS in one shift and the NAS in the next shift. When the number of patients in the next shift was added to the model, the NAS-night shift could explain up to 80% of the variation of NAS-day shift, and the NAS-day shift could explain 70% of the variation of NAS-evening shift. This was valid for the unit however not for individual patients. In our study, we analyzed the number of patients in the next shift retrospective. That number would be an unknown factor prospectively, but mean number of patients expected for the shift could be included in the calculation. In this study, patient characteristics had no practical impact on the NAS unlike results found in other studies [2, 10]. Results above 70% show that NAS on one shift has a large effect on NAS on the next shift [19] and that the patient classification system, NAS, can support nurses and managers with the allocation of resources from one shift to the next. The NAS is a dynamic bottom-up instrument that can guide resource planning for a postoperative unit/ICU. Studies have found that bottom-up approach could be a more accurate instrument to guide costing approach [18, 20, 21].

To our knowledge, this is the first study to explore whether total NAS in one shift could predict total NAS in the next shift. To get the full overview of workload in a unit, we ask that all

patients regardless of the length of stay should be included since everybody receives nursing care. The study by Decock et al. [12] determined care intensity by NAS cut-offs and found a predictivity of 69.7%–74.0% from one shift to the next. The study included all patients (3,295) admitted on weekdays, unlike our study, which also included patients admitted on weekends. The main difference between the studies was the length of stay, with a short median time of 3.4 h, versus Decock et al.'s 2.8 days. The study by Decock et al. does not describe whether patients with a short length of stay were included or whether patients were adults and/or children, surgical, and/or medical [12]. The study confirmed the findings in our study that NAS can substantially contribute to predicting workload on the next shift.

The staff in charge use their professional judgement to estimate if available resources and expected use of resources agree. Electronic systems are already used to operational NAS trends and characteristics [16]. A mobile NAS application set up to calculate and predict the workload for the next shift could confirm the professional judgement in allocation of resources for the next shift.

The length of stay in our study is in line with a study from a postoperative unit that included all patients with a length of stay of more than 1 h [6]. Other studies have excluded patients with length of stay < 4 –24 h [8, 15, 22, 23]. We argue that all patients receiving care from a nurse should be included regardless of the length of stay. Not to include all admitted patients could unintentionally exclude a significant amount of workload. Several studies have found an association between the NAS and length of stay [1, 6, 10, 23]. Our study could not analyze this association because the length of stay was included and calculated within the NAS.

In our study, older patients and men were associated with higher scores of NAS when individual data were analyzed. This association was small (not significant), which is in line with other studies [1, 6, 10, 23, 24]. Furthermore, surgical patients had lower scores than medical patients which is in line with the findings of a study by Moghadam et al. [10]. Type of surgery could explain the lower scores for surgical patients as the hospital does not perform heart-, lung-, neuro-, or trauma surgery. There are no gynecological or children service at the hospital. Lima and Rabelo found an association between NAS, length of stay, and magnitude of surgery [6]. Whether the magnitude of surgery or length of stay had the strongest association with NAS was not explored in our study and requires further research.

We found that the NAS from patients on the night shift had the highest median score (55.6%) versus the patients on the day shift (19.6%). On the other hand, the total scores from all patients (aggregated data) were lowest on night shifts and highest on day shifts. Other studies have found low scores on night shifts and the highest scores during the day shifts [1, 10, 22]. In our study, fewer patients at night could explain the low aggregated scores on the night shifts. This means that the unit needed fewer nurses at night, but patients who stayed in the unit at night received more nursing activities.

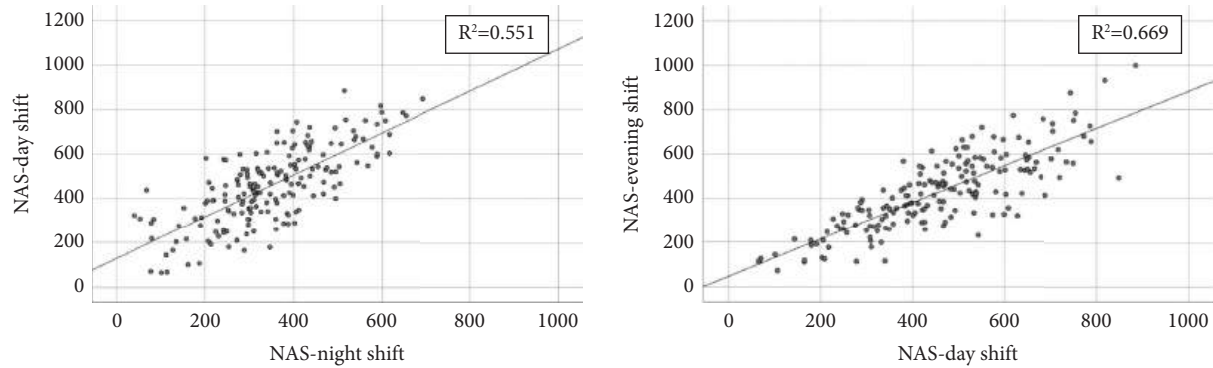


FIGURE 1: Association between NAS-night shift vs NAS-day shift and NAS-day shift vs NAS-evening shift on aggregated data. NAS, Nursing Activities Score.

In our study, the NAS was scored by nurses responsible for patient care. A study by Stuedahl found poor agreement between scores performed by bedside nurses versus managers and physicians [17] and confirmed the initiation by Miranda et al. that the bedside nurse should perform the NAS on every shift [14].

4.1. Limitations. This study had some limitations. Only one unit was included, and the retrospective design could only assess associations, not causalities. Including only patients who stayed over to the next shift could change the results and requires further investigation. The study population was a case mix of medical, surgical, elective, and emergency patients, and further research should be performed on the generalizability of our findings. The NAS does not consider the competence level of nurses, and further research should investigate the associations and factors between competence level, workload, patient safety, and quality of care. The NAS does not include emergency preparedness in the scoring, which are important factors for allocating nurses to the next shift. Our unit included length of stay in the NAS, which makes the scores difficult to compare with earlier studies. The COVID-19 pandemic, with an extraordinary workload worldwide, caused a delay in processing results and writing articles.

The strengths of this study include having a complete dataset for all days and shifts during the study period, and that bedside nurse scored NAS on all patients.

4.2. Implications and Recommendations for Practice. This study found that the NAS together with number of patients on the next shift could explain up to 80% of the variation of workload on the next shift. Implications for practice could be that the NAS tool can confirm professional judgement to allocate resources for the upcoming shift. We recommend the development of a mobile NAS application that merge the NAS for one shift, the number of patients expected on the next shift, available nurse staff, and emergency preparedness. This objective application together with professional judgement can empower managers prioritize scarce resources on a shift-to-shift-basis.

5. Conclusions

This study found that the NAS can be used to predict nursing workload from one shift to the next and be a beneficial instrument for managers to adjust their staffing requirements. However, patient safety and the best quality of care are also influenced by other factors, such as nurses' qualifications, cooperation among healthcare professionals, and external variables. However, these were not included in the aim of this study and require further research.

Data Availability

Data were collected from an internal database in the hospital's administrative system.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

AMH designed and conducted the study, supervised data collection, administered the project, and performed data analysis, interpretation, and writing of the original manuscript. ØK designed the study, performed data analysis and interpretation, and contributed to the writing of the manuscript. SKS contributed to the interpretation of data and writing of the manuscript. AMH, SKS, and ØK conceptualized the study. AMH curated the data. AMH, SKS, and ØK performed the formal analysis. AMH and ØK designed the methodology. SKS and ØK supervised the study. AMH, SKS, and ØK validated the study. AMH, SKS, and ØK contributed to the visualization. AMH, SKS, and ØK reviewed and edited the manuscript. All authors have read and approved the final manuscript.

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Research Article

Optimizing Nursing Productivity: Exploring the Role of Artificial Intelligence, Technology Integration, Competencies, and Leadership

Atallah Alenezi ¹, Mohammed Hamdan Alshammari ²,
and Ibrahim Abdullatif Ibrahim ^{1,3}

¹Nursing Department, College of Applied Medical Science, Shaqra University, Shaqra, Saudi Arabia

²Mental Health Nursing Department, College of Nursing, University of Ha'il, Ha'il, Saudi Arabia

³Nursing Administration Department, Faculty of Nursing, Mansoura University, Mansoura, Egypt

Correspondence should be addressed to Ibrahim Abdullatif Ibrahim; ielhehe@su.edu.sa

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Background. In the rapidly evolving healthcare management landscape, technology integration and artificial intelligence utilization play pivotal roles in shaping employee productivity. This research investigates these dynamics within Riyadh Province, Kingdom of Saudi Arabia, focusing on the relationships between technology integration, the use of artificial intelligence in nursing profession, nursing workforce competencies, technological leadership, and employee productivity. **Methods.** A quantitative approach was employed, involving 329 nurses from five hospitals in Riyadh Province. Partial Least Squares Structural Equation Modeling facilitated comprehensive analysis of direct and indirect relationships among variables. **Results.** Findings reveal that technology integration significantly enhances nursing productivity, while the use of artificial intelligence initially presents disruptions before yielding productivity gains. Nursing workforce competencies mediate these relationships, emphasizing the critical role of workforce readiness in harnessing technology's benefits. Surprisingly, technological leadership did not significantly moderate these effects. **Conclusions.** This research offers vital insights for healthcare organizations, advocating strategic technology integration and workforce development. It underscores the significance of nursing competencies in navigating technological transformations and affirms the enduring importance of leadership in guiding these changes. As healthcare evolves, these findings provide guidance for optimizing technology and artificial intelligence to enhance employee productivity and patient care.

1. Introduction

The continuous evolution of technology and its integration into healthcare systems have ushered in a transformative era in the field of healthcare management [1]. In the contemporary healthcare landscape, where innovation plays a pivotal role, understanding the intricate dynamics between technology, workforce competencies, leadership, and employee productivity is paramount [2, 3]. As healthcare organizations adopt technology and artificial intelligence (AI) to enhance patient care and streamline operations, understanding the implications of these advancements on

employee productivity becomes crucial [1]. Technology integration, encompassing the assimilation of various technologies into healthcare processes, and the use of AI in nursing roles, representing the incorporation of AI tools into nursing roles, hold immense significance within this context [3]. Furthermore, the role of nursing workforce competencies in navigating these technological shifts and the influence of technological leadership in guiding these changes are of paramount importance [4].

Prior research has consistently emphasized the positive impact of technology integration on healthcare organizations [3, 4]. Effective technology integration can lead to

improved operational efficiency and enhanced patient care outcomes [5]. Additionally, healthcare organizations that successfully integrate technology experience higher levels of employee productivity [6]. Recent studies have explored the integration of AI into nursing roles and its implications [4]. The study by Chicoine observed that while AI can optimize healthcare processes, its introduction may initially disrupt established workflows, potentially affecting productivity [4]. The AI integration requires workforce adjustments and training to mitigate any negative impact on productivity [3].

Moreover, the role of workforce competencies in healthcare settings has been extensively investigated [7]. Research has emphasized the importance of nursing competencies in effectively utilizing technology to enhance patient care [6]. Workforce competencies are critical in realizing the potential benefits of technological advancements in healthcare [8]. Additionally, the role of leadership in guiding technology adoption has been a subject of inquiry. A study by Khan highlighted the significance of transformational leadership in fostering an innovative culture within healthcare organizations [9]. Also, leadership plays a crucial role in ensuring that technology adoption aligns with organizational objective [10].

Despite the substantial body of research on each of these variables individually, there exists a notable gap in comprehensively understanding how they interact within the specific context of healthcare organizations [4]. Previous studies have often focused on isolated aspects, neglecting the holistic interplay between technology integration, the use of AI in nursing roles, nursing workforce competencies, technological leadership, and their combined impact on employee productivity [4, 6, 9].

Additionally, the specific contextual factors in Riyadh Province and the broader Kingdom of Saudi Arabia may introduce unique dynamics that warrant dedicated investigation [11, 12]. Riyadh, the capital and largest city of Saudi Arabia, boasts a diverse population and a wide array of healthcare institutions, encompassing primary care facilities and advanced hospitals. Notably, approximately 82% of private health institutions are located in Riyadh city, with the remaining 18% distributed across peripheral provinces [13]. The Kingdom of Saudi Arabia is now experiencing fast modernization and development, with a special focus on the healthcare sector. These efforts are being pushed by the Vision 2030 projects, which aim to diversify the economy and enhance healthcare services [14].

This research seeks to address these gaps by providing a comprehensive examination of these variables and their relationships, offering valuable insights for healthcare organizations navigating the evolving landscape of healthcare management. This research endeavors to shed light on these critical relationships within the context of healthcare organizations. By examining the impact of technology integration, the use of AI in nursing roles, nursing workforce competencies, and technological leadership on employee productivity, this study aims to contribute valuable insights to the healthcare management literature and offer practical implications for healthcare organizations navigating this dynamic terrain.

This study is driven by several interconnected objectives. Firstly, it aims to investigate the impact of technology integration on productivity within healthcare organizations. Secondly, it seeks to explore how the use of AI in nursing influences employee productivity in this context. Thirdly, the research aims to understand the mediating role of nursing workforce competencies in the relationships between technology integration and employee productivity, as well as the use of AI in nursing and employee productivity. Lastly, it endeavors to examine whether technological leadership moderates the relationships between technology integration and employee productivity and the use of AI in nursing and employee productivity.

Based on the identified gap in the literature and the overall objective of the study, this research aims to address the following research questions:

- (1) How does technology integration impact productivity within healthcare organizations?
- (2) What is the influence of the use of AI in nursing on employee productivity in the healthcare context?
- (3) What is the mediating role of nursing workforce competencies in the relationships between technology integration and employee productivity, as well as the use of AI in nursing and employee productivity?
- (4) Does technological leadership moderate the relationships between technology integration and employee productivity and the use of AI in nursing and employee productivity?

2. Literature Review and Hypothesis Development

The healthcare sector in Saudi Arabia has experienced significant growth and advancement in recent decades [11]. This shift has been marked by extensive funding for healthcare facilities, technologies, and employee training in an effort to improve healthcare delivery across the country [5]. The healthcare system in the Kingdom has undergone a transition from predominantly government-funded and government-provided to encompassing private sector involvement, fostering heightened competition and innovation [12]. Riyadh, as the capital and largest metropolis of the Kingdom, is at the forefront of advancements in medical treatment [15]. The urban area has several medical facilities, encompassing both publicly and privately funded institutions, all of which demonstrate a steadfast dedication to delivering exemplary healthcare services [15]. It is crucial for healthcare organizations to prioritize addressing issues related to nurses' productivity, as it directly impacts the quality of care delivered to patients. Recognizing the importance of improving employee productivity, healthcare organizations aim to enhance patient outcomes and ensure the highest level of care within the healthcare sector [6].

The implementation of advanced technologies has played a significant role in healthcare reform initiatives in Saudi Arabia [11]. Hospitals in Riyadh and across the

Kingdom have deployed advanced information technology systems to improve patient record management, streamline administrative processes, and enhance diagnostic and therapeutic capabilities [12]. Technological integration is expected to considerably impact the delivery of healthcare services, which may have a consequential effect on healthcare workers' efficiency [16]. Furthermore, Riyadh hospitals and the healthcare industry in Saudi Arabia as a whole have given significant attention to AI in nursing. AI-driven applications such as medical diagnosis algorithms and robotic surgical aids have the potential to improve healthcare delivery [17].

The introduction of AI into nursing positions is anticipated to result in significant shifts in the nature of nursing work and its impact on overall workforce productivity [16]. The successful implementation of technology and AI in Riyadh hospitals relies heavily on the competencies of the nursing profession, another focal point of this research [15]. Healthcare personnel, including nurses, in Saudi Arabia have benefited from extensive government-funded training and development initiatives to prepare them for the impact of technological changes [18]. However, the role that these skills play in mediating the connection between tech adoption, AI utilization, and worker output is still a subject of debate [4]. Technological leadership also plays a crucial role in the current healthcare system [19, 20]. Leaders in Riyadh's hospitals, both at the managerial and clinical levels, play a critical role in advancing technological projects, fostering a spirit of innovation, and maximizing the benefits of technology and AI while minimizing their drawbacks [3, 15]. Effective leadership is essential for guiding the healthcare industry through the technological transition taking place in Riyadh, Saudi Arabia, as evidenced by the moderating influence of technological leadership on the relationship between technology integration, AI utilization, and employee productivity [17, 18].

2.1. Technology Integration and Employees' Productivity. Technology integration refers to the extent to which an organization incorporates advanced technologies, digital tools, and information systems into its daily operations and workflows [21]. This encompasses not only the adoption of technology but also its effective utilization to streamline processes and enhance overall organizational performance [22]. Empirical evidence from diverse sectors underscores the pivotal role of technology integration in enhancing employee productivity [23]. Employee productivity, a multifaceted concept encompassing the measurement of an employee's work output, including factors such as task completion, work quality, and efficiency, has garnered significant attention in organizational research [24]. At its core, it reflects the organization's ability to effectively utilize its human resources to achieve its goals and objectives. One prominent factor influencing employee productivity is the level of technology integration within the organization [25].

Theoretical support for the relationship between technology integration and employees' productivity can be found in the Resource-Based View (RBV) of the firm, which

posits that organizations can gain sustained competitive advantages by possessing and effectively leveraging valuable and rare resources [26]. In the context of technology integration, advanced technological infrastructure becomes a valuable resource that contributes to increased productivity. By integrating technology effectively into their operations, organizations can optimize their processes, improve task efficiency, and ultimately bolster employee productivity [27]. Numerous empirical studies have corroborated the positive relationship between technology integration and employee productivity across various industries [28]. For example, firms that have successfully integrated technology into their operations have reported higher levels of employee productivity compared to those that lag in technological adoption [3]. In the healthcare sector, the adoption of health information technologies has been linked to improvements in both employee productivity and patient care outcomes [8], further emphasizing the broad applicability of this relationship.

From a theoretical standpoint, the RBV framework provides insights into how technology integration influences employee productivity by viewing technology as a valuable resource that contributes to organizational success [29]. This perspective aligns with the notion that technology, when effectively integrated, serves as a catalyst for efficiency improvement and productivity enhancement [30]. Thus, organizations that strategically leverage technology as a resource are better positioned to achieve sustainable competitive advantages and foster a culture of productivity and innovation. Therefore, we developed the following hypothesis.

Hypothesis 1. Technology integration significantly affects employees' productivity.

2.2. Utilization of AI and Employee Productivity. The utilization of AI in nursing occupations refers to the extent to which AI technologies, including AI-assisted diagnostics and decision support systems, are embedded within the responsibilities of nurses in healthcare settings [31]. In the context of healthcare, where precision and timeliness are paramount, the integration of AI technologies into nursing roles emerges as a significant independent variable that shapes the landscape of employee productivity [32]. Empirical investigation demonstrated that AI integration holds promise for enhancing the efficiency and productivity of healthcare personnel, particularly nurses [30].

Employee productivity, a multifaceted construct encompassing job completion, work quality, and efficiency, is a critical measure of organizational performance and effectiveness [33].

The concept of augmentation suggests that AI technologies serve to complement rather than replace human capabilities, aligning seamlessly with the notion that AI integration in nursing roles enhances employee efficiency [34]. The concept of augmentation also provides a theoretical framework for the relationship between the utilization of AI and employee productivity. Empirical evidence underscores

the significant impact of AI applications on employee productivity within the healthcare sector [35]. AI-driven solutions, such as clinical decision support systems and AI-assisted diagnostics, have demonstrated potential in expediting and refining patient care processes, thereby bolstering the productivity of healthcare staff, including nurses [36]. Notably, in fields like radiology, AI algorithms have markedly improved the efficiency of radiologists' work, highlighting the positive influence of AI on productivity [37]. The theoretical underpinning of the augmentation concept further validates this hypothesis, emphasizing that the goal of AI technology is to complement human labor rather than supplant it [38]. When integrated into nursing roles, AI technologies can support healthcare professionals in tasks such as data analysis, decision making, and patient monitoring, enabling them to fulfill their responsibilities more effectively [39]. Thus, the theoretical expectation is that the utilization of AI in nursing roles will enhance their productivity by augmenting their capabilities, aligning closely with the proposed hypothesis.

Hypothesis 2. Use of AI significantly affects nurses' productivity.

2.3. Nursing Workforce Competencies as Mediator. Nurses' competencies encompass all aspects of nursing and include knowledge, attitude, and skills [40]. Nursing workforce competencies are pivotal in facilitating the effective utilization of technology and thereby contributing to organizational productivity [31]. Extensive empirical research has consistently highlighted the positive correlation between technology integration and employee productivity across diverse industries, underlining the significance of technological advancements in enhancing organizational performance [41]. Similarly, studies have underscored the profound impact of a highly competent nursing workforce on organizational productivity, emphasizing the critical role of competencies in driving efficiency and effectiveness [27]. However, while existing research has independently explored the relationships between technology integration, employee productivity, and the influence of competencies on productivity, there remains a dearth of empirical studies directly investigating the mediating role of nursing workforce competencies in the context of technology integration within healthcare settings [42]. Nonetheless, given the crucial role of nursing competencies in leveraging the potential of technology, it is theoretically plausible to posit that nursing workforce competencies serve as a mediating mechanism in the relationship between technology integration and employee productivity [28]. The theoretical support for this hypothesis based on the Job Demands-Resources (JD-R) model suggests that job demands and job resources influence employee outcomes, including productivity [43]. In the context of technology integration in nursing, competencies can be seen as job resources. By possessing the necessary competencies, nurses are better equipped to manage the demands of using technology in their work. These competencies act as mediators between technology integration and employee productivity, as they

enable nurses to effectively navigate and utilize technology, leading to improved productivity outcomes [44].

Grounded in this theoretical framework, it is proposed that the competencies possessed by nursing professionals act as a conduit between the integration of technology and its subsequent impact on employee productivity [45]. As nurses acquire greater proficiency and knowledge in effectively utilizing technology, they are better equipped to optimize their productivity levels, thereby supporting the proposition of the mediating role of nursing workforce competencies in the context of technology integration [46]. This hypothesis underscores the intricate interplay between technology integration, nursing workforce competencies, and employee productivity, emphasizing the need for further empirical investigation to unravel the underlying mechanisms and implications for healthcare organizations.

Hypothesis 3. Nursing workforce competencies significantly mediate the relationship between technology integration and employees' productivity.

Empirical research has emerged as a strong advocate for the integration of AI within healthcare, particularly in nursing roles, as a means to bolster efficiency and productivity [39]. This body of evidence underscores the transformative potential of AI technologies in streamlining processes, optimizing decision making, and improving patient outcomes. Concurrently, a wealth of studies has consistently highlighted the positive correlation between a highly competent nursing workforce and organizational productivity [38].

The competencies possessed by nursing professionals, including clinical expertise, critical thinking skills, and technological proficiency, are acknowledged as key drivers of operational effectiveness and quality of care delivery [37]. However, despite the abundance of research in both domains, there remains a notable gap in the literature concerning the direct exploration of the mediating role of nursing workforce competencies in the context of AI utilization within nursing roles [36]. This gap presents an opportunity for theoretical exploration and empirical investigation to shed light on the intricate interplay between these variables [34].

The theoretical framework supporting the hypothesis of nursing workforce competencies as a mediator between AI utilization and employee productivity is rooted in the concept of mediation, a fundamental tenet of causal inference in social science research [30]. According to this framework, nursing workforce competencies serve as an intermediary mechanism through which the utilization of AI technologies influences employee productivity. The rationale behind this proposition lies in the premise that more competent nurses are inherently better equipped to leverage AI tools effectively within their roles [21].

Competencies related to AI, such as data interpretation, algorithm understanding, and system integration, empower nurses to harness the full potential of AI technologies to enhance their workflow efficiency, clinical decision making, and overall productivity [25]. As nursing professionals acquire and apply these competencies in their daily practice, they are theoretically poised to optimize their productivity

levels, thereby bridging the gap between AI utilization and enhanced employee productivity [24]. This theoretical perspective not only provides a conceptual framework for understanding the dynamics at play but also offers practical insights for healthcare organizations seeking to leverage AI technologies to their fullest potential [22].

In summary, the hypothesis of nursing workforce competencies as a mediator between AI utilization and employee productivity represents a novel avenue for research inquiry in the field of healthcare management and nursing practice [23]. By elucidating the underlying mechanisms and pathways through which AI technologies impact productivity outcomes, this line of research has the potential to inform evidence-based strategies for workforce development, technology implementation, and organizational performance improvement within healthcare settings.

Hypothesis 4. Nursing workforce competencies significantly mediate the relationship between the use of AI and nurses' productivity.

2.4. Technological Leadership as Moderator. Technological leadership in healthcare refers to utilizing advanced technology as AI applications to enhance the quality of care and assist patients, healthcare professionals, and organizations in diagnosis, treatment, safety, and resource allocation [19]. Technological leadership in healthcare requires proactive and visionary leaders that actively promote digital innovation, set a good example, and adapt to changing circumstances to ensure the effective adoption of health information technology in the healthcare field [47].

Technological leadership serves as a crucial determinant of an organization's ability to effectively adopt and implement technology, thereby fostering innovation and maximizing its utilization [3]. Empirical research consistently underscores the positive relationship between technology integration and employee productivity, highlighting the importance of integrating advanced technologies into organizational workflows [26]. Additionally, studies have emphasized the pivotal role of effective leadership in shaping the outcomes of technology adoption and implementation across various industries. However, despite the recognized significance of leadership in technology-related decisions and organizational culture, limited empirical research directly examines the moderating effect of technological leadership on the relationship between technology integration and employee productivity within healthcare settings [33]. Nevertheless, it is theoretically plausible to posit that technological leadership acts as a moderator in this relationship, potentially enhancing or attenuating its strength depending on the effectiveness of leadership practices [32]. The theoretical basis for this hypothesis draws upon the concept of moderation, which suggests that technological leadership can exert an influence on the strength and direction of the relationship between technology integration and employee productivity [31].

Effective leadership practices may facilitate the successful integration and utilization of technology, thereby amplifying its positive impact on employee productivity. Conversely, ineffective leadership may impede technology integration efforts, resulting in a weaker relationship between technology adoption and productivity [41]. The theoretical underpinning of this hypothesis underscores the importance of leadership in shaping organizational processes and outcomes, particularly in the context of technology adoption and utilization [27]. By recognizing the moderating role of technological leadership, healthcare organizations can better understand and leverage leadership practices to optimize the impact of technology on employee productivity [28]. Further empirical research is warranted to empirically validate this theoretical proposition and elucidate its implications for healthcare management and leadership practices.

Hypothesis 5. Technological leadership significantly moderates the relationship between technology integration and nurses' productivity.

Empirical research has unequivocally demonstrated the potential of AI to enhance employee productivity within healthcare, particularly in nursing professions [48]. Simultaneously, studies have underscored the critical role of leadership in shaping the outcomes of technology adoption and deployment across various industries [44]. However, despite the growing body of evidence supporting the individual impacts of AI utilization and technological leadership, there exists a gap in empirical research regarding the moderating effect of technological leadership on the relationship between AI utilization in nursing roles and employee productivity within healthcare settings [45]. Nevertheless, from a theoretical standpoint, it is plausible to suggest that technological leadership acts as a moderator in this relationship, exerting influence on the strength and direction of the impact of AI utilization on employee productivity based on leadership effectiveness [46].

The theoretical foundation for this hypothesis is grounded in the concept of moderation, which posits that technological leadership can shape the relationship between the use of AI in nursing roles and employee productivity [39]. Effective leadership practices may facilitate the successful integration and utilization of AI technologies within nursing workflows, thereby enhancing employee productivity [38]. Conversely, ineffective leadership may impede AI adoption efforts, resulting in a weaker relationship between AI utilization and productivity [37]. Thus, the theoretical support for this hypothesis stems from the notion that technological leadership can moderate the relationship between AI utilization in nursing roles and employee productivity within healthcare organizations [36]. In essence, understanding the moderating role of technological leadership can provide valuable insights for healthcare organizations seeking to optimize the impact of AI technologies on employee productivity [34]. Further empirical research is needed to validate this theoretical proposition and explore

its implications for leadership practices and technology implementation strategies in healthcare settings.

Hypothesis 6. Technological leadership significantly moderates the relationship between the use of AI in nursing roles and employee productivity.

Based on the aforementioned review of literature and hypothesis development, the conceptual and theoretical model of the study was developed as shown in Figure 1.

2.5. Methodology. This study adopted a quantitative research design to investigate the intricate relationships among key variables in healthcare organizations located in Riyadh Province, Kingdom of Saudi Arabia. A purposive sampling method was employed to select a sample of 329 nurses, drawn from five different hospitals within Riyadh Province, ensuring representation from diverse healthcare facilities. The participants met specific inclusion criteria, namely, active involvement in clinical nursing practice within the selected hospitals.

To assess the research variables, validated measurement scales and items from previous research were adapted and customized to align with the unique context of this study. The key variables under scrutiny included technology integration, the use of AI, nursing workforce competencies, technological leadership, and productivity among nursing workforce.

The study variables were measured using adapted items from the scales of previous studies as follows: Technology integration was measured with three items [49]. The use of AI in nursing jobs was measured with eight items [50]. A three-item scale was employed for assessing nursing workforce competencies [51]. Technological leadership was measured with seven items [52]. Nursing productivity was measured on a six-item scale [53]. The participants rated their responses on a five-point Likert scale.

Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM), a robust statistical technique suitable for analyzing complex models, particularly in scenarios with smaller sample sizes and a focus on prediction and understanding intricate relationships. PLS-SEM allows for the examination of both direct and indirect effects among variables, making it an ideal choice for this research.

The analytical process consisted of several steps, including data preprocessing, measurement model assessment, structural model estimation, and mediation and moderation analysis. Data were cleaned, checked for outliers, and assessed for normality to ensure data validity. Missing data were managed using appropriate imputation techniques.

The measurement model was evaluated to confirm the reliability and validity of measurement scales. This involved assessments of composite reliability (CR), average variance extracted (AVE), and discriminant validity. The structural model was then estimated to explore relationships among variables, and mediation and moderation effects were analyzed to understand the roles of nursing workforce competencies and technological leadership in mediating and moderating relationships.

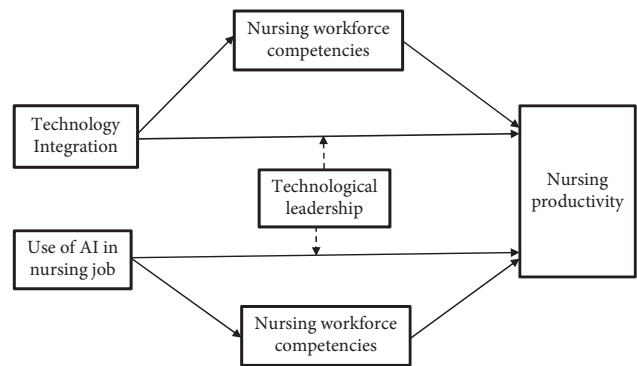


FIGURE 1: Conceptual and theoretical model of the study.

To ensure research validity and reliability, rigorous strategies were employed, including robust questionnaire design, adaptation of validated scales, and meticulous data analysis techniques. The quality and accuracy of the measurement model were validated through assessments CR, AVE, and discriminant validity.

Data collection was conducted through a meticulously designed structured questionnaire, tailored specifically for this study. To maximize convenience and efficiency, participants were administered the questionnaire electronically via e-mail and online survey platforms. Clear instructions were provided, emphasizing the research's purpose and the importance of providing accurate responses. Data collection was conducted over a defined period to ensure consistency and minimize potential external influences.

Ethical approval for this study was obtained from the Research Ethics Committee at the University of Hail in Saudi Arabia (Reference number: H-2023-298; dated: August 2, 2023). The study was conducted in accordance with the principles of the Declaration of Helsinki. Participants were informed of the study's aim, voluntary participation, and right to withdraw without penalty. Each individual gave informed consent before completing the questionnaire. All responses were kept strictly confidential for research purposes only, and the results did not personally identify respondents. The data collection period was carefully planned to maintain consistency and minimize potential temporal variations that could affect research outcomes. Data handling and storage adhered to data protection regulations to uphold participant confidentiality and privacy.

3. Results

Table 1 and Figure 2 show that the item loadings of utilization of AI in nursing jobs construct vary from 0.791 to 0.858, suggesting a robust association between the items and the construct. The CR rating of 0.938 above the required threshold of 0.7 suggests excellent internal consistency. The AVE score of 0.684 indicates that 68.4% of the variability in the construct is explained by the items. Cronbach's alpha coefficient of 0.923 provides additional evidence supporting the dependability of the concept.

Furthermore, the item loadings of employee productivity construct vary from 0.544 to 0.847, suggesting a reasonable

TABLE 1: Reliability and validity statistics of the study variables.

Construct	Items	Item loading	CR	AVE	Cronbach's alpha
Use of AI in nursing jobs	AI1	0.810	0.938	0.684	0.923
	AI2	0.855			
	AI3	0.796			
	AI4	0.830			
	AI5	0.848			
	AI6	0.791			
	AI7	0.858			
Employee productivity	EP3	0.544	0.835	0.566	0.741
	EP4	0.752			
	EP5	0.847			
	EP6	0.827			
Nursing workforce competencies	NWC1	0.723	0.754	0.508	0.729
	NWC2	0.625			
	NWC3	0.781			
Technology integration	TI1	0.828	0.798	0.569	0.724
	TI2	0.692			
	TI3	0.738			
Technological leadership	TL1	0.510	0.858	0.565	0.806
	TL2	0.926			
	TL3	0.485			
	TL4	0.931			
	TL5	0.778			

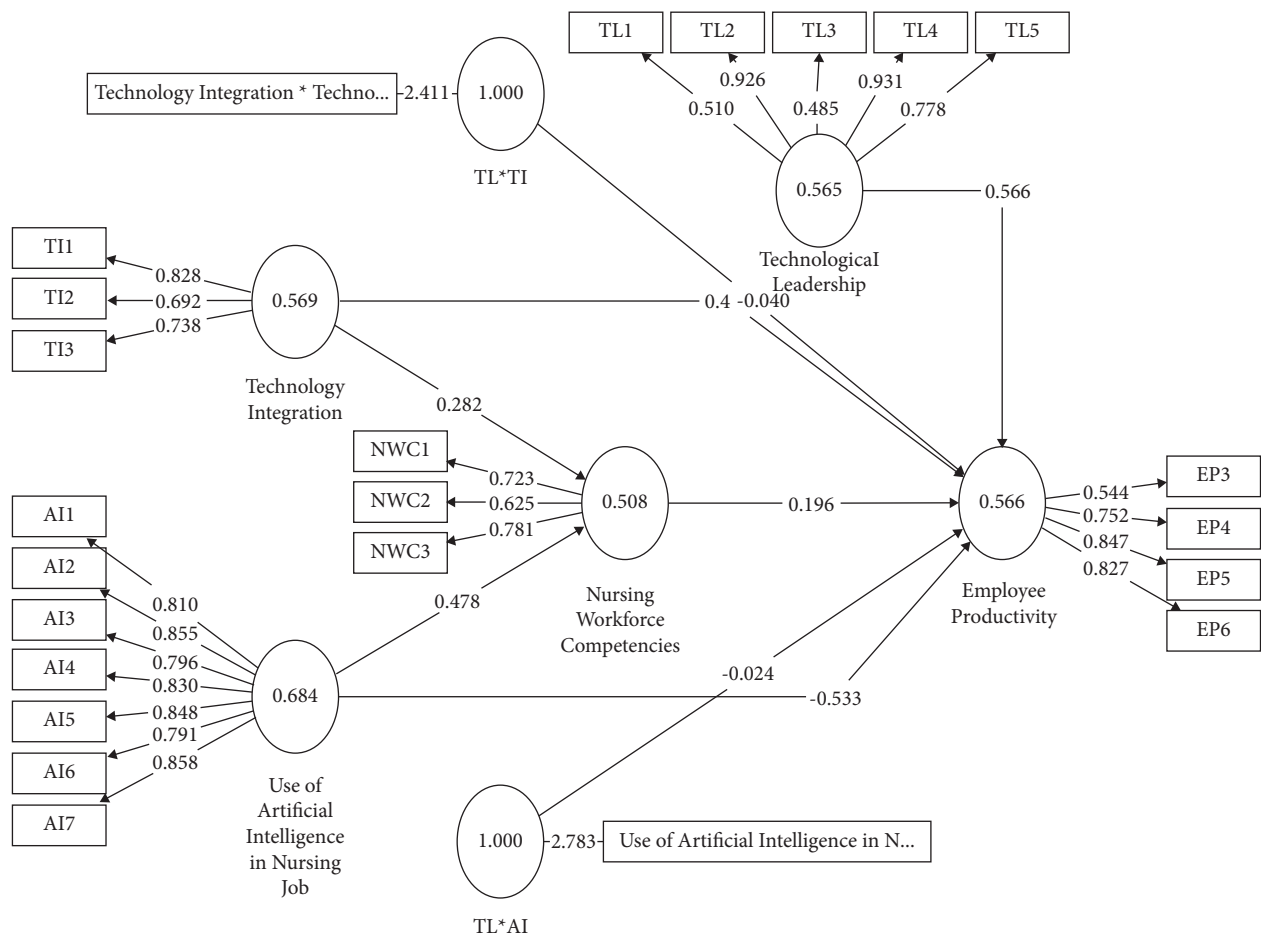


FIGURE 2: Measurement model.

correlation between the items and the construct. The CR value was 0.835 above the predetermined threshold, indicating a high level of internal consistency. The AVE of 0.566 indicates that 56.6% of the variation in the construct is explained by the components. Cronbach's alpha coefficient of 0.741 provides additional evidence for the dependability of the concept.

The item loadings of nursing workforce competencies construct vary from 0.625 to 0.781, suggesting a satisfactory correlation between the items and the construct. The CR value of 0.754 satisfies the required level, suggesting satisfactory internal consistency. The AVE score of 0.508 indicates that 50.8% of the variability in the construct can be accounted for by the components. Cronbach's alpha coefficient of 0.729 provides additional evidence of the construct's dependability. The item loadings of technology integration construct vary from 0.692 to 0.828, suggesting a reasonable correlation between the items and the construct. The CR value of 0.798 above the threshold indicates excellent internal consistency. The AVE score of 0.569 indicates that 56.9% of the variability in the construct can be explained by the items. Cronbach's alpha coefficient of 0.724 provides additional evidence for the dependability of the concept.

The item loadings of technological leadership vary from 0.510 to 0.931, suggesting a satisfactory correlation between the items and the construct. The CR value of 0.858 above the threshold indicates excellent internal consistency. The AVE score of 0.565 indicates that 56.5% of the variability in the construct is accounted for by the components. Cronbach's alpha coefficient of 0.806 provides additional evidence supporting the dependability of the concept.

Table 2 presents the Fornell–Larcker model, which assesses the discriminant validity of the study's constructs. This model examines whether each construct is more strongly correlated with its own latent variable than with other latent variables, thereby confirming their distinctiveness. The diagonal elements of the table display the square roots of the AVE values for each construct. For employee productivity, the diagonal value is 0.752, indicating that the AVE of this construct is greater than its correlations with other constructs, confirming its discriminant validity. Similarly, for nursing workforce competencies, the diagonal value is 0.712, exceeding its correlations with other constructs, supporting its distinctiveness. Technological leadership also demonstrates distinctiveness, as its diagonal value of 0.751 is higher than its correlations with other constructs. Technology integration exhibits distinctiveness with a diagonal value of 0.755, surpassing its correlations with other constructs. Finally, the use of AI in nursing job construct displays strong discriminant validity, as its diagonal value of 0.827 is greater than its correlations with other constructs. These results from the Fornell–Larcker model confirm that each construct in the study is distinct from the others, substantiating their discriminant validity and supporting the robustness of the measurement model.

Table 3 presents the results based on the Heterotrait-Monotrait (HTMT) criterion, which evaluates the discriminant validity of the study's constructs. The HTMT

TABLE 2: Fornell–Larcker model.

	1	2	3	4	5
Employee productivity	0.752				
Nursing workforce competencies	0.481	0.712			
Technological leadership	0.646	0.520	0.751		
Technology integration	0.560	0.565	0.411	0.755	
Use of AI in nursing job	0.291	0.645	0.584	0.593	0.827

TABLE 3: HTMT criterion.

	1	2	3	4	5
Employee productivity					
Nursing workforce competencies	0.741				
Technological leadership	0.693	0.749			
Technology integration	0.810	0.711	0.670		
Use of AI in nursing job	0.335	0.603	0.874	0.757	

values indicate the extent to which constructs are more correlated with their own latent variables compared to others. For employee productivity, the table is empty, indicating that this construct does not correlate with other constructs beyond its latent variable. For nursing workforce competencies, the HTMT value is 0.741, suggesting that it has a stronger correlation with its own latent variable than with others, supporting its discriminant validity. Technological leadership exhibits a HTMT value of 0.749, indicating that it is more strongly correlated with its own latent variable than with other constructs, thus confirming its distinctiveness. Technology integration demonstrates HTMT values of 0.810, 0.711, and 0.670 with other constructs, all below the threshold of 0.85, which is indicative of discriminant validity. The use of AI in nursing job exhibits HTMT values of 0.335, 0.603, 0.874, and 0.757, all below the 0.85 threshold, indicating that this construct is distinct from others and possesses discriminant validity. These results based on the HTMT criterion affirm the discriminant validity of each construct in the study, providing confidence in the measurement model's robustness.

Table 4 displays the model fit statistics, which assess the predictive quality of the research model. The $Q^2_{predict}$ value, equal to 0.612, represents the model's predictive accuracy. This value suggests that the research model has a good predictive capability, indicating that it can effectively estimate and explain the relationships among the studied variables. A root mean square error (RMSE) of 0.073 was found. The root mean square error (RMSE) is a measure of how well a model fits the data, and a smaller RMSE suggests that the model's predictions are close to the observed values. The mean absolute error (MAE) value is also provided (0.084). The mean absolute error (MAE) quantifies how off estimates are, on average. Higher predictive accuracy is indicated by a smaller MAE, which indicates that the model's predictions are, on average, quite close to the actual data. Taken together, these model fit statistics indicate that the research model is a good fit for the data and may be used to make informed inferences about the relationships between the variables of interest.

TABLE 4: Model fit.

Q ² predict	RMSE	MAE
0.612	0.073	0.084

TABLE 5: R-square.

Variable	R-square
Employee productivity	0.636
Nursing workforce competencies	0.467

Table 5 presents the R-square values for the study's variables, which indicate the proportion of variance in the dependent variable explained by the independent variables. For employee productivity, the R-square value is 0.636. This indicates that approximately 63.6% of the variance in employee productivity can be explained by the independent variables in the model, suggesting a strong explanatory power. For nursing workforce competencies, the R-square value is 0.467. This suggests that the model's explanatory power is moderate, as the independent variables account for about 46.7% of the variance in nursing workforce competencies. These R-square values assist in evaluating the overall explanatory power of the model by showing how well the independent variables in the study explain the variability in the relevant dependent variables.

Table 6 provides valuable insights into the F-square values, which illuminate the proportion of variance in the dependent variable explained by the independent variables within the study. In the context of employee productivity, these F-square values demonstrate the contributions of each independent variable: technological leadership emerges as a significant factor, explaining approximately 35.1% of the variance in employee productivity. Technology integration also plays a substantial role, contributing around 26.4% to the explanation of employee productivity. Additionally, the use of AI in nursing profession exhibits notable influence, contributing approximately 26.5% to the explanation of employee productivity. Nursing workforce competencies contribute about 5.3% to the explanation of the variance in employee productivity. For nursing workforce competencies, it is noteworthy that technological leadership contributes about 9.7% to the explanation of the variance in nursing workforce competencies. Technology integration contributes around 2.64% to the explanation of nursing workforce competencies, and it also contributes about 5.3% to its own variance. These F-square values collectively shed light on the explanatory power of the independent variables in relation to the dependent variables.

Table 7 presents the results of the path analysis, which elucidate the relationships between the variables in the research model. First, the path from technology integration to employee productivity demonstrates a positive relationship with a path coefficient of 0.437. This finding indicates that an increase in technology integration is associated with higher employee productivity (see Figure 3). The T-statistic of 6.093 is statistically significant ($p < 0.001$), underlining the robustness of this relationship. Similarly, the path from the use

of AI in nursing jobs to employee productivity shows a negative relationship with a path coefficient of -0.533 . This implies that a greater use of AI in nursing jobs is linked to lower employee productivity. This relationship is statistically significant with a T-statistic of 6.861 ($p < 0.001$).

Moreover, the indirect path from technology integration to nursing workforce competencies and subsequently to employee productivity reveals a positive relationship with a path coefficient of 0.055. This indicates that as technology integration increases, it positively affects nursing workforce competencies, which, in turn, enhances employee productivity. This path is statistically significant, with a T-statistic of 2.354 ($p = 0.009$). Similarly, the indirect path from the use of AI in nursing jobs to nursing workforce competencies and then to employee productivity shows a positive relationship with a path coefficient of 0.094. This suggests that an increased use of AI in nursing jobs positively influences nursing workforce competencies, subsequently leading to higher employee productivity. This path is also statistically significant, with a T-statistic of 3.214 ($p = 0.001$). Regarding moderation effects, the interaction terms (TLAI and TLTI) did not yield statistically significant relationships with employee productivity. The path coefficients for TLAJ and TLTI are -0.024 and -0.040 , respectively, with T-statistics of 0.678 ($p = 0.249$) and 0.981 ($p = 0.164$), suggesting that technological leadership does not significantly moderate the relationship between the use of AI in nursing duties or technology integration and employee productivity. These path analysis results provide a comprehensive understanding of how the variables in the study are interrelated and their respective impacts on employee productivity within the context of the research model (see Table 7).

4. Discussion

The purpose of the research was to examine the correlations between technological leadership, employee productivity, nursing workforce competencies, AI usage in the nursing jobs, and technological integration among nursing staff in the healthcare organizations at Riyadh Province, Saudi Arabia. A positive and statistically significant association between technology integration and employee productivity was indicated by the data, which verified Hypothesis 1. This finding aligns with previous research suggesting that effective integration of technology can enhance employee productivity [17]. Hypothesis 2 was also supported by the results, revealing a negative and statistically significant relationship between the use of AI in nursing job and employee productivity. This is consistent with prior studies, which suggest that the introduction of AI in healthcare settings may necessitate workforce adjustments and potentially lead to initial decreases in productivity [3]. The mediation effect proposed in Hypothesis 3 was substantiated by the data. It was found that nursing workforce competencies significantly mediate the relationship between technology integration and employee productivity. This result emphasizes the crucial role of nursing competencies in harnessing the benefits of technology, aligning with existing literature [24]. Hypothesis 4 was also supported, with

TABLE 6: *F*-square.

The study variables	Employee productivity	Nursing workforce competencies
Nursing workforce competencies	0.053	
Technological leadership	0.351	
Technology integration	0.264	0.097
Use of AI in nursing profession	0.265	0.278

nursing workforce competencies mediating the relationship between the use of AI in nursing duties and employee productivity. This underscores the importance of competence development among nurses to maximize the positive impact of AI technologies, in line with prior studies [3].

Hypothesis 5 did not receive empirical support, as technological leadership was not found to significantly moderate the relationship between technology integration and employee productivity. This finding contrasts with some existing research [48] and suggests that within the healthcare context studied, leadership may not play a significant moderating role in this specific relationship. Similarly, Hypothesis 6 was not supported by the data. Technological leadership was not found to significantly moderate the relationship between the use of AI in nursing tasks and employee productivity. This outcome may indicate that, within the healthcare context studied, leadership did not exert a notable moderating influence on this specific relationship.

The findings of this research provide valuable insights into the intricate dynamics between technology, workforce competencies, leadership, and productivity in healthcare organizations in Riyadh Province, Kingdom of Saudi Arabia. They underscore the need for healthcare institutions to carefully manage the integration of technology and the introduction of AI into nursing roles to optimize employee productivity. The positive relationship between technology integration and employee productivity highlights the potential benefits of effectively adopting and integrating advanced technologies in healthcare settings. This finding supports the idea that technology can enhance operational efficiencies and ultimately lead to improved productivity, which is consistent with previous literature [24]. Conversely, the negative relationship between the use of AI in nursing duties and employee productivity suggests that while AI technologies offer significant advantages in healthcare, their implementation can initially disrupt established workflows and processes. This finding resonates with research indicating that the introduction of AI may require adjustments and training to mitigate any negative impact on productivity [48].

The mediating role of nursing workforce competencies in both relationships emphasizes the importance of equipping healthcare professionals, particularly nurses, with the necessary skills and knowledge to effectively use technology and AI tools. This finding aligns with existing literature emphasizing the role of workforce competencies in realizing the potential benefits of technological advancements in healthcare [54]. Surprisingly, the study did not find significant moderation effects of technological leadership in either relationship. This result suggests that, in the specific healthcare context studied, leadership may not exert

a substantial influence on the relationship between technology adoption and employee productivity. However, it is important to note that leadership remains a critical component of successful technology implementation in healthcare organizations [54].

4.1. Limitations and Future Research Directions. While this research contributes valuable insights to the field of healthcare management and technology adoption, it is important to acknowledge its limitations. Firstly, the study was conducted in the specific context of healthcare organizations in Riyadh Province, Kingdom of Saudi Arabia. The findings may not be directly transferable to diverse cultural, organizational, or regional settings. Future research should explore the generalizability of these findings across diverse healthcare contexts. Secondly, the research primarily relied on quantitative data, and the results are based on self-reported measures. While this approach provides valuable quantitative insights, it may not capture the full spectrum of qualitative nuances and contextual factors that influence technology adoption and employee productivity in healthcare settings. Future studies could incorporate qualitative methods to provide a richer understanding of these dynamics. Thirdly, this research focused on a selected set of variables, primarily technology integration, the use of AI, nursing workforce competencies, and technological leadership. While these variables are critical within the healthcare context, there may be additional factors, such as organizational culture, resource availability, and patient demographics, that influence the relationships explored in this study. Future research should consider a broader range of variables to provide a more comprehensive analysis.

Building on the insights gained from this research, several avenues for future investigation emerge. Firstly, further exploration of the role of leadership in technology adoption and its impact on employee productivity is warranted. The qualitative studies can delve into the leadership styles and practices that effectively facilitate technology integration in healthcare organizations. Secondly, as technology and AI continue to evolve rapidly, ongoing research is needed to assess their long-term effects on employee productivity and patient outcomes. Longitudinal studies can provide valuable insights into the sustainability of productivity gains and potential adjustments required over time. Thirdly, cross-cultural research can shed light on how cultural factors influence the relationships examined in this study. Comparative analyses across different healthcare systems and regions can enhance our understanding of the generalizability of these findings and the role of cultural

TABLE 7: Path analysis.

	Original sample	Standard deviation	T statistics	P values
Technology integration \geq employee productivity	0.437	0.072	6.093	≤ 0.001
Use of AI in nursing \geq employee productivity	-0.533	0.078	6.861	≤ 0.001
Technology integration \geq nursing workforce competencies \geq employee productivity	0.055	0.023	2.354	0.009
Use of AI in nursing \geq nursing workforce competencies \geq employee productivity	0.094	0.029	3.214	0.001
Technological leadership * use of AI in nursing \geq employee productivity	-0.024	0.036	0.678	0.249
Technological leadership * technology integration \geq employee productivity	-0.040	0.041	0.981	0.164

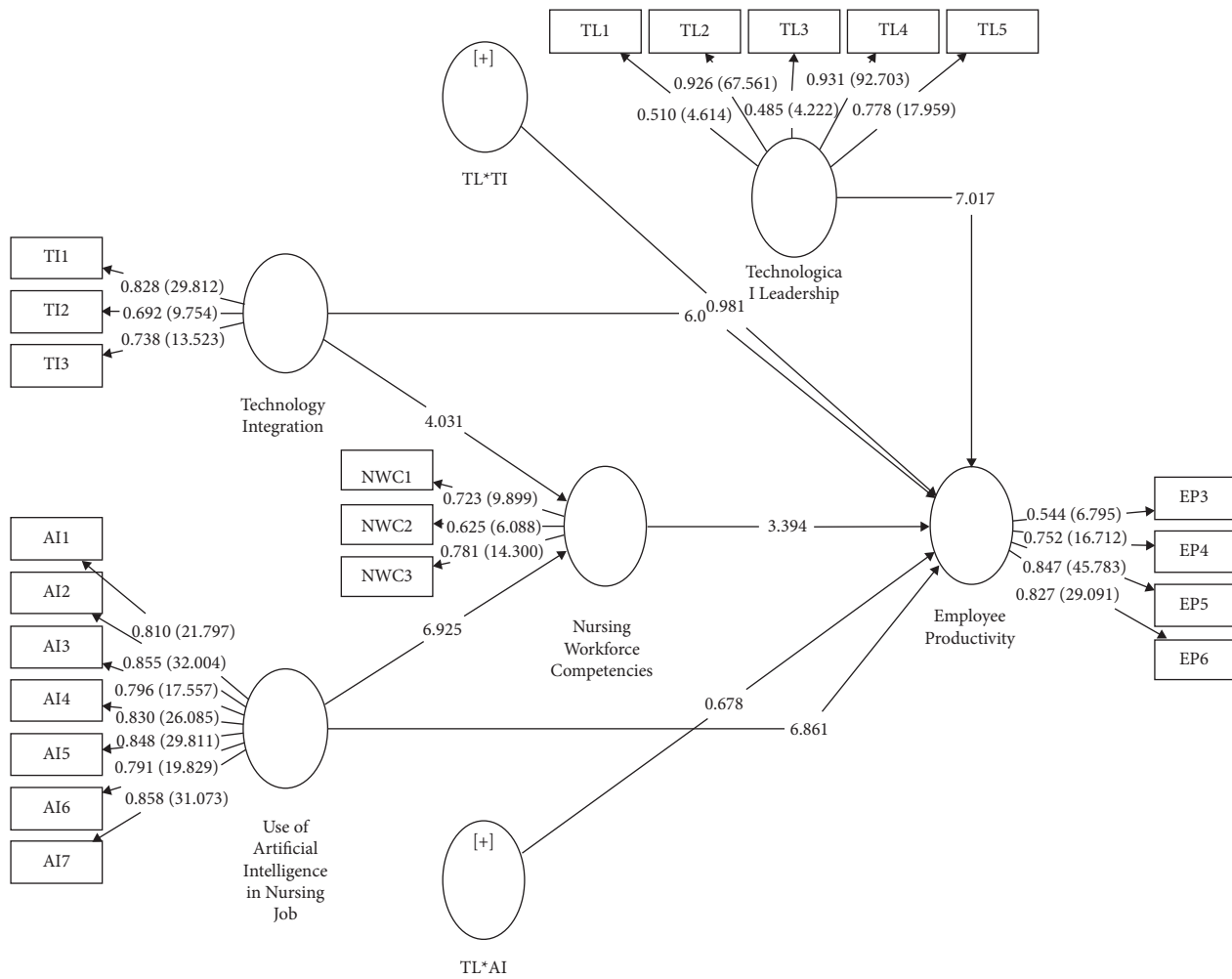


FIGURE 3: Structural model results.

contexts. Lastly, investigations into the impact of specific AI applications and technologies on nursing roles and patient care outcomes could offer specialized insights. Research could focus on the effectiveness of AI tools in tasks such as diagnostics, treatment planning, and patient monitoring, providing a more granular understanding of their effects.

In summary, this research lays the foundation for future studies to explore, refine, and expand upon the relationships between technology adoption, workforce competencies, leadership, and employee productivity in healthcare settings. Addressing these limitations and pursuing these research directions will contribute to a more nuanced and comprehensive understanding of technology-driven transformations in healthcare management.

4.2. Implications of the Study

4.2.1. Theoretical Implications. This research has several theoretical implications that contribute to the existing body of knowledge in healthcare management and technology adoption. Firstly, it reinforces the importance of considering the mediating role of nursing workforce

competencies when examining the impact of technology integration and the use of AI on employee productivity. This mediation framework provides a more comprehensive understanding of the complex relationships within healthcare organizations. Secondly, the findings challenge the assumption that technological leadership invariably moderates the relationship between technology adoption and employee productivity. This suggests that the influence of leadership may vary depending on contextual factors and organizational dynamics. It prompts further exploration of the nuanced role of leadership in technology-driven healthcare environments.

4.2.2. Practical Implications. Based on the study's findings, healthcare organizations should develop comprehensive training programs to enhance nurses' competencies in technology utilization. This can include specific training on various technologies, such as Electronic Health Record (EHR) systems, telemedicine platforms, and remote monitoring devices. By equipping nurses with the necessary skills and knowledge, they will be better prepared to effectively leverage technology in their daily practice.

While the study did not find significant moderation effects of technological leadership, it is still an essential component of successful technology implementation. Therefore, healthcare leaders should prioritize the development of a culture that encourages innovation and embraces technological advancements. Creating platforms for nurses to share insights and ideas on utilizing technology to improve processes can foster collaboration between nurses and technology specialists. Additionally, establishing innovation committees or task forces can help drive the adoption of innovative solutions.

Continuous monitoring and evaluation of technology integration's impact on nurse productivity and job satisfaction is crucial. Regular assessments, surveys, or feedback mechanisms can be utilized for this purpose. By collecting and analyzing data on the effectiveness of technology implementation, healthcare organizations can identify areas for improvement and make necessary adjustments to optimize outcomes.

To facilitate a smooth transition to technology integration, healthcare organizations should provide the necessary resources and support systems. This includes offering technical support, providing access to training materials and resources, and ensuring that nurses have sufficient time and support to adapt to new technologies. Establishing regular communication and feedback channels will address any concerns or challenges that may arise during the implementation process.

Healthcare organizations should also develop workforce adjustment strategies. This can involve reevaluating job roles and responsibilities, considering workload redistribution, or providing additional training and support to help nurses adapt to AI technologies. Proactive measures to address potential challenges can mitigate the negative impact on productivity and promote job satisfaction. By implementing these practical recommendations, healthcare organizations can enhance nurse productivity while increasing job satisfaction. This, in turn, can lead to improved patient outcomes and overall organizational performance.

5. Conclusions

In conclusion, this research has provided valuable insights into the complex dynamics between technology integration, the use of AI in nursing jobs, nursing workforce competencies, technological leadership, and employee productivity within healthcare organizations in Riyadh Province, Kingdom of Saudi Arabia. The study confirmed that effective technology integration positively influences employee productivity, while the use of AI, while beneficial in the long term, may initially pose productivity challenges. Furthermore, the mediating role of nursing workforce competencies emphasizes the critical need for ongoing training and skill development to harness the full potential of technology and AI in healthcare settings. Although this study did not find significant moderating effects of technological leadership, it is essential to recognize the enduring importance of leadership in guiding technological advancements and change management in healthcare organizations. Leaders must play

a pivotal role in fostering a culture of innovation and ensuring that technology adoption aligns with organizational goals. The findings underscore the significance of a well-prepared and adaptable healthcare workforce, capable of embracing and effectively utilizing technological advancements to enhance patient care and overall organizational performance. Healthcare organizations should prioritize workforce development programs and training initiatives to bridge competency gaps and facilitate the successful integration of technology. In summary, this research contributes to the understanding of how technology, AI, competencies, and leadership intersect in the healthcare sector. It provides healthcare administrators and policymakers in Riyadh Province, Kingdom of Saudi Arabia, with valuable insights to inform strategic decisions and investments in technology, workforce development, and leadership practices. As the healthcare landscape continues to evolve, these insights will be instrumental in ensuring that organizations can maximize the benefits of technological advancements while maintaining and improving employee productivity and patient care.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

AA and MHA were responsible for study design, data collection, and study supervision. AA, MHA, and IAI were responsible for data analysis and interpretation and manuscript writing. IAI was responsible for statistical advice, rewriting, review, editing, and critical revisions for important intellectual content. All authors are in agreement with the content of the manuscript. Additionally, each author had provided final approval of the version to be published.

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Research Article

Organizational Culture and Trust Affect the Team-Based Practice and Job Satisfaction of Nurse Practitioners in Acute Care Hospitals: A National Survey

Sheng-Shiung Huang ¹, Hsiu-Fang Jen,² Shio-Luan Tsay ¹, Ya-Jung Wang ³,
and Heng-Hsin Tung ⁴

¹College of Nursing and Health Sciences, Da-Yeh University, Changhua, Taiwan

²Department of General Surgery, China Medical University Beigang Hospital, Yunlin, Taiwan

³Department of Nursing, Da-Yeh University, Changhua, Taiwan

⁴School of Nursing, National Yang Ming Chiao Tung University, Taipei, Taiwan

Correspondence should be addressed to Shio-Luan Tsay; sltsay0308@gmail.com

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Background. The link between organizational culture, organizational trust, job satisfaction, and team-based practice among nurse practitioners (NPs) has not been examined simultaneously. **Aim.** To identify the effects of organizational culture, organizational trust, and other factors on NPs such as job satisfaction and team-based practice. **Methods.** We used a cross-sectional design with a national sample. Data were collected using an online survey of 1,100 NPs working in acute care settings. The survey included demographic and working characteristics, the Organizational Culture Scale, the Organizational Trust Scale, the Misener Nurse Practitioner Job Satisfaction Scale (MNPJSS), and the NP-physician relations (NP-PR) subscale of the Nurse Practitioner Primary Care Organizational Climate (NP-PCOCQ). Multiple regression analysis with a stepwise selection method explored potential factors that influence job satisfaction and team-based practice. **Results.** A learning environment, psychological safety, senior leadership support, commitment to the organization, and the organizational culture and trust were positively associated with higher job satisfaction, which accounted for 49.2% of the variance in NPs' job satisfaction. Organizational trust, commitment to the organization, and learning environment promoted better team-based practice significantly. Also, NPs working a fixed shift pattern showed higher levels of team-based practice. These factors accounted for 23.66% of variances in team-based practice. **Conclusion.** Organizational culture and organizational trust affect the job satisfaction and team-based practice of NPs in acute care practices. **Implications for Nursing Management.** Acute care hospitals are encouraged to develop policies to enhance a learning environment, a supportive organizational culture, and trust in NPs' practice.

1. Introduction

Within 3 years, Taiwan is entering a superaged society (20% of the population above 65 years old in 2026) [1]. This will impose an even higher demand and burden on the healthcare system. Since 2006, in response to the growing demands of healthcare in the aging population, nurse practitioners (NPs) hold a key position as healthcare providers in acute care hospitals.

The scope of Nurse Practitioners' (NPs) practice was influenced by state laws and regulations in the USA, leading to three primary practice classifications: full practice, reduced practice, and restricted practice (American Association of Nurse Practitioners) [2]. Notably, NPs' practice scope in Taiwan aligns closely with the US model of restricted practice, involving supervision by physicians during clinical patient care [3].

Currently, more than 10,000 NPs provide healthcare in more than 350 acute care hospitals in Taiwan (Taiwan Association of Nurse Practitioners [4]). A recent study documented that NPs not only provide high-quality healthcare but also alleviate the burden on the healthcare system [5]. Hence, developing and retaining the NP workforce is a critical strategy for enhancing the quality and outcomes of acute care organizations. Specifically, the job satisfaction of NPs within acute care practices contributes to the care outcomes and retention of NPs [6].

NPs in Taiwan mainly work closely with physicians using a team-based practice model. A higher team climate or collaboration reported better care outcomes and higher job satisfaction [7]. NP studies further suggested that the various organizational supports enhance the job satisfaction of NPs [8–10]. For instance, findings from Ho et al. [8] indicated that NPs who perceived higher levels of organizational support experienced greater job satisfaction. Similarly, Luo et al. [9] concluded that healthcare administrators could enhance NPs' job satisfaction by improving organizational support in practice. In addition, studies on physicians similarly documented that organizational culture affects physicians' trust in the organization, which impacts job satisfaction and patients' trust [11, 12], especially when physicians perceive their organizational cultures to have an emphasis on quality, communication, and information, cohesiveness among clinicians, and values alignment between physicians and leaders [12]. However, those studies were conducted in the medical professions. Whether those results can be applied to NPs warrant further study to verify the results. Furthermore, the relationship between organizational culture, trust, team-based practice, and job satisfaction of NPs in acute care practices requires to be examined simultaneously. The results of the study can provide vital pieces of information to administrators for creating policies that could enhance team-based practice and job satisfaction of NPs.

Organizational culture is defined as the mutual perspective, assumptions, and standards of an organization's membership, and strong organizational cultures can support staff members to accomplish goals, complete tasks assigned to them, and perceive fulfillment in their job [13]. An enhanced organizational culture could also enable healthcare professionals to cope with complex and changing environments [14]. Several studies have shown that organizational culture is an important factor in job satisfaction [13, 15–17]. Zhang and Li [17] found a relationship between organizational culture and employee satisfaction. Kim et al. [18] reported that organizational culture significantly predicted job satisfaction among registered nurses. Similarly, Tsai [19] stated that organizational culture significantly increased job satisfaction in Taiwan. To summarize, the supportive organizational culture was beneficial for healthcare professionals to practice effectively, and hence they demonstrated better job satisfaction. Although a positive correlation between organizational culture and job satisfaction has been reported among healthcare professionals or nurses, the results of previous studies were limited by sample size,

generalizability, and non-NP samples. The link between organizational culture and job satisfaction among NPs has yet to be explored.

Interdisciplinary teamwork is an essential model for delivering healthcare to patients in acute care settings. Teamwork or team-based practice is defined as activities or processes through which team members achieve common goals by collaborating as a team [20]. Healthcare practice required well communication and cooperation between diverse clinical professionals. The relationship between NPs and physicians is important in team-based practice, which promotes better health outcomes [21]. Moreover, a strong culture engaged healthcare professionals to develop stronger teams with competitive advantages [22]. Several studies have shown the effects of organizational culture on team-based practice. Clarke [23] indicated that organizational culture develops mutual learning that facilitated discussions and negotiations among team members to meet patients' needs and achieve interdisciplinary team working. Abu-Jarad et al. [24] noted that organizational culture is a key dimension in studies that investigate organizational performance, and they found that organizational culture was positively correlated with organizational performance. Körner et al. [25], in a multicenter study, also found a direct influence of organizational culture on teamwork. As this literature has shown, a supportive organizational culture was the benefit of establishing effective teamwork. However, these results were based upon data from a small sample, and the specific influence of different dimensions of organizational culture on team-based practice among NPs is still unclear.

Although the influence of organizational culture on job satisfaction or teamwork has been studied extensively, studies within acute care settings among NPs are still scarce. Moreover, a significant body of previous studies measured culture as a single dimension. Measuring only one dimension of culture may cause a narrow view of the concept that ignores various sources of heterogeneity such as the environment or management support. Yet, organizational culture is a multidimensional construct, so the influence of organizational culture on professional outcomes can be viewed from a broader perspective [26]. Therefore, it is necessary to explore the influence of multiple dimensions of culture on NP practice outcomes such as job satisfaction and team-based practice among NPs.

In addition, organizational trust was a critical factor for job satisfaction. Organizational trust could be viewed as the faith of employees that the organization will make an all-out effort to achieve the commitment of employees [27]. Moreover, organizational trust may enhance the cooperation between employees and organizations, lead to effective communication, and compensate for any inadequate abilities of employees [28, 29]. Evidence from management and nursing studies suggested that organizational trust was essential for well-function organizations [30–32]. However, only a few studies have investigated the correlation between organizational trust and job satisfaction with nurses or healthcare professionals. For example, a positive correlation between organizational trust and job satisfaction was supported for nurses [31] and physicians

[30]. Furthermore, clinicians with improved or stable high trust reported higher satisfaction than those whose trust declined [11]. Nevertheless, the role and context of practice differed between NPs and other employees. At present, there are few studies focusing on the effects of organizational trust on job satisfaction among NPs.

Likewise, the correlation between organizational trust and teamwork was also examined by previous literature. Nonetheless, research on the influence of organizational trust on teamwork in the clinical field is scarce. Isik et al. [33] found that there is a positive relationship between teamwork and organizational trust among workers in call centers. Tekingündüz et al. [34] revealed that employees who worked at hospitals with higher levels of trust could feel valuable and important; hence, they were more willing to perform better. In addition, recent studies identified that organizational trust was positively related to team performance [35, 36]. However, these results were focused on a nonclinical sample, and the generalizability of previously published research on this issue was problematic. To the best of our knowledge, the lack of exploration of the link between organizational trust and job satisfaction among NPs remains a gap in the literature.

In considering the results of previous literature, we applied Herzberg's motivation-hygiene theory to explore potential factors affecting job satisfaction and team-based practice among NPs. Herzberg [37] classified factors influencing job satisfaction into motivators and hygiene factors in the workplace. The motivators are sometimes referred to as satisfiers, which are intrinsic conditions of the job itself, such as personal growth, opportunities for advancement, and a sense of importance to an organization. The hygiene factors are sometimes referred to as dissatisfiers, which are extrinsic to the work itself, such as working conditions, relationships with colleagues or supervisors, and organizational policies. If these hygiene factors were absent, staff would demonstrate more dissatisfaction with their job. In the current study, we classified NPs' demographic characteristics, organizational culture, and organizational trust as motivators or hygiene factors. We aimed and hypothesized that various organizational cultures and organizational trust affect NPs' job satisfaction and team-based practice.

2. Methods

2.1. Design. This study had a cross-sectional design, and it involved a national online survey to explore potential factors influencing job satisfaction and team-based practice.

2.2. Participants. We recruited participants from the Taiwan Association of Nurse Practitioners (TANP). NPs who had national certified licenses and had been working as NPs in acute care settings for at least 1 year were eligible for inclusion.

2.3. Ethical Considerations. The study was approved by the Institutional Review Board (IRB) of the China Medical University Hospital (CMUH111-REC3-059). Before eligible

NPs filled out the questionnaire, they were asked to read the detailed information about the contents of the study and complete a written informed consent via a unique link to the online survey. The study was also conducted in compliance with the ethical standards of the Helsinki Declaration.

2.4. Data Collection. There were 9,536 active members of TANP, and 6,808 eligible NPs were invited to participate from March to May 2022. Detailed information about the study's aims, procedures, written informed consent, and a unique link to the online survey were provided in each e-mail. In total, 1,113 NPs agreed to participate and completed the survey. The response rate was 16.35%. Thirteen participants were excluded from the analysis due to incomplete data (e.g., missing values in demographic data). As result, 1,100 participants were retained for further analysis. There was no significant difference between incomplete data and analyzed data in job satisfaction ($t = 0.07$, 95% CI (-2.60, 2.80), $p = 0.94$) and teamwork ($t < 0.001$, 95% CI (-0.25, 0.25), $p = 1.00$). The setting of a power analysis was conducted with $G * Power$ 3.1.9.7 for multiple regression analysis [38, 39]. According to the previous finding, the effect size (Cohen's f^2) ranged from 0.19 to 0.53 [15, 25]. We used a medium effect size value of 0.15 to conservatively calculate the sample size. With the effect size (Cohen's f^2) of 0.15, a statistical power of 0.90, a significant level of 0.05, and 10 potential predictors, the estimated sample size was 147. In addition, we assumed that the attrition rate of the online survey was about 10% [40]. Hence, the effective sample size for multiple regression analysis should be more than 162. The final number of the current study ($n = 1,100$) was sufficient to conduct the analysis.

2.5. Measurement

2.5.1. Demographic and Working Characteristics. The demographic characteristics of NPs, including age, gender, marital status, educational degree, working status, hospital level of practice, working hours per day, years of NP experience, NP advancement level, patient load, and annual salary, were surveyed by a series of questions.

2.5.2. Job Satisfaction. NPs' job satisfaction was assessed using the Misener Nurse Practitioner Job Satisfaction Scale (MNPJSS) developed by Misener and Cox [41]. This scale comprised 44 self-administered items with six dimensions, namely intrapractice partnership/collegiality; challenge/autonomy; professional, social, and community interaction; professional growth; time; and benefits. Each item was rated on a 6-point scale (ranging from very dissatisfied to very satisfied). Higher scores indicated a higher level of job satisfaction perceived by individuals in practice. MNPJSS has demonstrated proper reliability and validity in previous research relating to job satisfaction, and Cronbach's alpha was 0.94–0.96 [41, 42]. Cronbach's alpha value for this study was 0.95.

2.5.3. Team-Based Care. NPs' team-based care was evaluated using the NP-physician relations (NP-PR) subscale of the Nurse Practitioner Primary Care Organizational

Climate (NP-PCOCQ) developed by Poghosyan et al. [43]. This scale was developed specifically for the NP practice environment. This scale comprised 29 self-administered items with four subscales: NP-PR, professional visibility (PV), NP-administration relations (NP-AR), and independent practice and support (IPS). Each item was rated on a 4-point scale (ranging from strongly disagree to strongly agree). The NP-PR subscale measured the teamwork, communication, and relationships between NPs and physicians in practice. Higher scores obtained from the NP-PR subscale indicated better teamwork in practice. Previous research also showed adequate reliability and validity. The Cronbach alpha of this subscale ranged from 0.87 to 0.95 in previous studies [43, 44]. Cronbach's alpha value for the NP-PR subscale for this study was 0.90.

2.5.4. Organizational Culture. NPs' organizational culture was measured with the Organizational Culture Scale designed by Bradley et al. [45]. This scale could identify substantial diversity in culture related to patient care. It consisted of 31 items rated on a 5-point scale with options from 1 (disagree strongly) to 5 (agree strongly). This scale detected organizational culture in five domains: (a) learning environment, (b) psychological safety, (c) commitment to the organization, (d) senior leadership support, and (e) time for improvement efforts. The learning environment indicated that hospitals provided the latest information or knowledge about patient care for NPs. Psychological safety revealed that hospitals valued NPs' challenging assumptions, new ideas, or unique skills, and that it is quite easy to seek help in practice. Commitment to the organization indicated the emotional attachment between NPs and hospitals. Senior leadership support occurred when opinion leaders focused on improvement, encouraged changes in the quality of patient care, and offered the necessary resources (e.g., personnel or equipment) for NPs in practice. Time for improvement efforts refers to the time invested in enhancing the quality of patients' care. Higher scores indicated that NPs perceived a higher level of organizational culture in the hospital. This Cronbach's alpha was 0.94 for the entire scale and ranged from 0.77 to 0.88 for the subscales, which showed substantial reliability and validity in previous studies [45, 46]. The Cronbach alpha was 0.91 for the whole scale, and it ranged from 0.61 to 0.93 for the subscales (learning = 0.93; psychological safety = 0.78; commitment = 0.69; support = 0.87; time for improvement = 0.61).

2.5.5. Organizational Trust. Organizational trust was assessed using the scale developed by Gabarro and Athos [47]. This scale is a 5-item self-reported scale rated on a 4-point Likert-type scale from 1 (strongly disagree) to 4 (strongly agree). Higher scores indicate a stronger level of employee trust in the organization. Previous research also demonstrated satisfactory reliability and validity for this scale and Cronbach's alpha was 0.94 [47, 48]. Cronbach's alpha in the current study was 0.82.

2.6. Statistical Analysis. The distributions of NPs' characteristics and study variables were used for univariate descriptive analyses including percentage, mean, and standard deviation (SD). An independent *t*-test was used to compare the means of two independent groups. Pearson product-moment correlation coefficients (γ) were calculated to examine the correlations between two continuous variables. Potential factors influencing job satisfaction and team-based practice were explored by multiple regression analysis with a stepwise selection method. The stepwise selection aims to identify a subset of variables that are most relevant for predicting job satisfaction. The significant variables from the univariate analysis were included in the regression analysis. The unstandardized coefficient (*B*), 95% confidence interval (95% CI), standardized coefficient (β), standard error (SE), ΔR^2 , and adjusted R^2 were also estimated by the multiple regression model. The multicollinearity of regression was examined with the variance inflation factor (VIF) [49]. The VIF should be less than 5 [50]. All data were analyzed with SPSS Statistics Version 22.0 (IBM, Armonk, NY, USA) software. The value of significance was 0.05.

3. Results

3.1. Descriptive Statistics for NPs' Characteristics. A total of 1,100 NPs with completed data were included in statistical analyses. The average age of our sample was 43.49 (SD = 5.84). Most NPs were females ($n = 1,052$; 95.60%), married ($n = 729$, 66.30%), and had completed a university ($n = 896$; 81.50%) or Master's/Ph.D. degree ($n = 204$, 18.5%). The average years of experience as NPs were 9.12 years (SD = 4.10), and most worked in regional hospitals ($n = 776$; 70.50%). More than half of NPs worked fixed shifts ($n = 619$; 56.30%), the average daily working hours were 9.16 (SD = 1.40), and they cared for 13.3 (SD = 8.39) patients per day shift. The NPs' professional career ladder level was mainly NP1 ($n = 271$, 24.6%) or NP2 ($n = 411$, 37.4%) (Table 1).

3.2. Correlations between NPs' Background, Job Satisfaction, and Team-Based Practice. The correlations between NPs demographic characteristics, job satisfaction, and team-based practice are summarised in Table 2. NPs who were married ($t = -2.36$, 95% CI (-0.81, -8.88), $p = 0.02$), higher on the professional career ladder level ($r = 0.12$, $p < 0.001$), and had higher annual salaries ($r = 0.15$, $p < 0.001$) reported higher job satisfaction. Daily working hours were negatively related to job satisfaction ($r = -0.09$, $p < 0.01$). Age ($r = 0.08$, $p = 0.01$), years of NP experience ($r = 0.11$, $p < 0.001$), professional career ladder level ($r = 0.09$, $p < 0.01$), and annual salary ($r = 0.12$, $p < 0.001$) were positively correlated with team-based practice. However, working in a rotating shift rather than on a fixed shift showed a lower level of team-based practice ($t = -2.89$, 95% CI (-0.17, -0.87), $p < 0.01$).

There was a significant positive association between job satisfaction and organizational trust ($r = 0.55$, $p < 0.001$) (Table 3). Job satisfaction was positively

TABLE 1: NPs' characteristics and study variables (N = 1,100).

Variable	n (mean)	% (SD)
Age (years)	43.49	5.84
<i>Gender</i>		
Female	1,052	95.60
Male	48	4.40
<i>Marital status</i>		
Married	729	66.30
Unmarried	371	33.70
<i>Educational degree</i>		
University	896	81.50
Graduate school or above	204	18.50
<i>Working status</i>		
Fixed shift	619	56.30
Rotating shift	481	43.70
<i>Hospital level</i>		
Medical center	324	29.50
Regional hospital	776	70.50
<i>Professional career ladder</i>		
NP1	271	24.6
NP2	411	37.4
NP3	118	10.7
NP4	17	1.5
NP5	41	3.7
Daily working hours	9.16	1.40
NP experience (years)	9.12	4.10
Daily patient load	13.38	8.39
Organizational trust	14.96	2.27
<i>Organizational culture</i>		
Learning environment	28.66	5.54
Psychological safety	25.62	4.46
Commitment to the organization	22.36	3.82
Senior management support	13.64	2.85
Time for improvement efforts	11.90	2.36
MNPJSS (job satisfaction)	168.51	32.31
Team-based practice	21.54	2.98

Note. SD, standard deviation; MNPJSS, Misener Nurse Practitioner Job Satisfaction Scale.

TABLE 2: Correlations between demographic and work characteristics, job satisfaction, and team-based practice (N = 1,100).

Variable	Job satisfaction				Team-based practice			
	Mean	SD	t/r	p	Mean	SD	t/r	p
Age (years)	—	—	0.56	0.07	—	—	0.08*	0.01
<i>Gender</i>								
Female	168.31	32.12	-0.96	0.34	21.54	2.93	-0.08	0.94
Male	172.90	36.36			21.58	3.92		
<i>Marital status</i>								
Married	170.14	30.94	-2.36*	0.02	21.60	2.99	-0.93	0.35
Unmarried	165.30	34.67			21.42	2.97		
<i>Educational degree</i>								
University	168.68	31.45	0.35	0.73	21.49	2.89	-1.06	0.29
Graduate school or above	167.74	35.93			21.76	3.36		
<i>Working status</i>								
Fixed shift	169.09	31.85	-0.68	0.50	21.77	3.04	-2.89**	0.004
Rotating shift	167.75	32.91			21.25	2.88		
<i>Hospital level</i>								
Medical center	169.19	32.53	1.08	0.28	21.34	2.77	1.51	0.13
Regional hospital	166.88	31.78			21.63	3.06		
Daily working hours	—	—	-0.09**	0.002	—	—	-0.03	0.34
NP experience (years)	—	—	0.06	0.07	—	—	0.11***	<0.001
Professional career ladder	—	—	0.12***	<0.001	—	—	0.09**	<0.01
Daily patient load	—	—	-0.03	0.27	—	—	-0.002	0.93
Annual salary	—	—	0.15***	<0.001	—	—	0.12***	<0.001

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

TABLE 3: Correlations among organizational culture, organizational trust, job satisfaction, and team-based practice ($N = 1,100$).

Variable	Job satisfaction	Team-based practice
Organizational trust	0.55***	0.45***
<i>Organizational culture</i>		
Learning environment	0.62***	0.39***
Psychological safety	0.59***	0.34***
Commitment to organization	0.51***	0.37***
Senior management support	0.56***	0.31***
Time for improvement efforts	0.02	-0.01
Total	0.69***	0.42***

Note. *** $p < 0.001$.

associated with all dimensions of organizational culture (r ranged from 0.56 to 0.62, $p < 0.001$) except for time for improvement. Furthermore, team-based practice was positively associated with organizational trust ($r = 0.45$, $p < 0.001$). Except for the time for improvement, all subscales of organizational culture were positively associated with team-based practice (r ranged from 0.31 to 0.39, $p < 0.001$).

3.3. Factors Influencing Job Satisfaction and Team-Based Practice. The results of the stepwise multiple regression on NPs' job satisfaction are in Table 4. Some 49.2% of the variances in NPs' job satisfaction were explained by organizational culture (learning environment, commitment to the organization, psychological safety, and senior leadership support), and organizational trust. Of these, the primary two variables that accounted for 37.8% of the variances were the learning environment dimension of organizational culture and psychological safety (7.2%). The higher learning environment ($B = 1.18$, 95% CI (0.77, 1.59), $p < 0.001$), psychological safety ($B = 1.77$, 95% CI (1.34, 2.21), $p < 0.001$), senior leadership support ($B = 1.54$, 95% CI (0.85, 2.23), $p < 0.001$), commitment to the organization ($B = 0.81$, 95% CI (0.33, 1.30), $p < 0.01$), and organizational trust ($B = 2.59$, 95% CI (1.75, 3.42), $p < 0.001$) were positively associated with higher job satisfaction.

Organizational trust, organizational culture (commitment to the organization and learning environment), and working status accounted for 23.66% of the variance in NPs' team-based practice. Organizational trust was the strongest independent predictor accounting for 20% of the variance in terms of team-based practice. Higher organizational trust ($B = 0.37$, 95% CI (0.27, 0.46), $p < 0.001$), commitment to the organization ($B = 0.13$, 95% CI (0.08, 0.18), $p < 0.001$), and learning environment ($B = 0.07$, 95% CI (0.13, 0.11), $p = 0.001$) were positively associated with higher team-based practice. Moreover, NPs who worked fixed shifts rather than rotating shifts had higher levels of team-based practice ($B = 0.38$, 95% CI (0.07, 0.69), $p < 0.001$) (Table 4).

The VIFs of each significant predictor for job satisfaction (which ranged from 1.82 to 2.74) and team-based practice (which ranged from 1.00 to 1.92) were less than 5, which indicated that there was no multicollinearity in the multiple regression model [50].

4. Discussion

Our findings were consistent with Herzberg's motivation-hygiene theory. We found that motivators such as organizational trust could promote both job satisfaction and team-based practice in practice. For the hygiene factors, only working status reduced NPs' performance in team-based practice. These results highlight the importance of the organizations' role in significantly improving the positive organizational culture in healthcare organizations and trust levels within the practice. Moreover, managers or supervisors could modify the working shift patterns of NPs to ensure better team-based practice.

4.1. Variables Affecting Job Satisfaction. Our study identified specific dimensions of organizational culture that influenced NPs' job satisfaction, which was consistent with Herzberg's motivation-hygiene theory (Figure 1(a)). To begin with, better learning environments improve job satisfaction. This might be because the learning environment may inspire NPs to put forth the remarkable effort and enhance their professional competency and professional growth. Along similar lines, hospitals with better learning environments could help NPs to gain new knowledge and advanced skills in the process of providing care. The internally motivated work behavior could improve the psychological states of employees (e.g., job satisfaction in the current study) [51]. One recent study also indicated that the utilization of NPs' education or on-the-job training was significantly correlated with job satisfaction [52]. The learning environment might increase practice variety and enhance NPs' motivation while producing better effectiveness in practice. Laschinger et al. [53] indicated that the enhancement of professional knowledge and expertise is critical for being effective in practice. Similarly, NPs viewed learning environments such as by continuing education as a vital element for professional growth, which could be recognized for their organizational efforts and enhance job satisfaction [54]. Subsequently, the learning environment increases NPs' identification and effectiveness of practice, which promote job satisfaction. To improve job satisfaction, the healthcare organizations should develop a supportive learning environment at the organizational level such as implementing advanced education programs, enhancing interdisciplinary communication, and improving the process of care by utilizing the latest information or clinical equipment.

TABLE 4: Potential factors associated with job satisfaction and teamwork among acute care NPs (N= 1,100).

Variables	B	SE	95% CI ^a	β	t	p	ΔR^2
<i>Job satisfaction</i>							
Constant	11.37	5.23	4.87, 25.05	—	2.17	0.03*	
<i>Organizational culture</i>							
Learning environment	1.18	0.21	0.77, 1.59	0.20	5.68	<0.001***	0.378
Psychological safety	1.77	0.22	1.34, 2.21	0.25	8.02	<0.001***	0.072
Organizational trust	2.59	0.43	1.75, 3.42	0.18	6.06	<0.001***	0.027
<i>Organizational culture</i>							
Senior management support	1.54	0.35	0.85, 2.23	0.14	4.38	<0.001***	0.01
Commitment to the organization	0.81	0.25	0.33, 1.30	0.10	3.31	<0.01**	0.005
Adjusted R ²							0.492
<i>Teamwork</i>							
Constant	11.11	0.57	9.98, 12.24	—	19.35	<0.001***	
Organizational trust	0.37	0.05	0.27, 0.46	0.28	7.61	<0.001***	0.20
<i>Organizational culture</i>							
Commitment to the organization	0.13	0.03	0.08, 0.18	0.16	5.09	<0.001***	0.027
Learning environment	0.07	0.02	0.03, 0.11	0.12	3.37	0.001**	0.008
Working status (ref: shift)	0.38	0.16	0.07, 0.69	0.06	2.41	0.02*	0.004
Adjusted R ²							0.236

Note. *p < 0.05; **p < 0.01; ***p < 0.001. ^aThe 95% CI was estimated by the unstandardized coefficient (B).

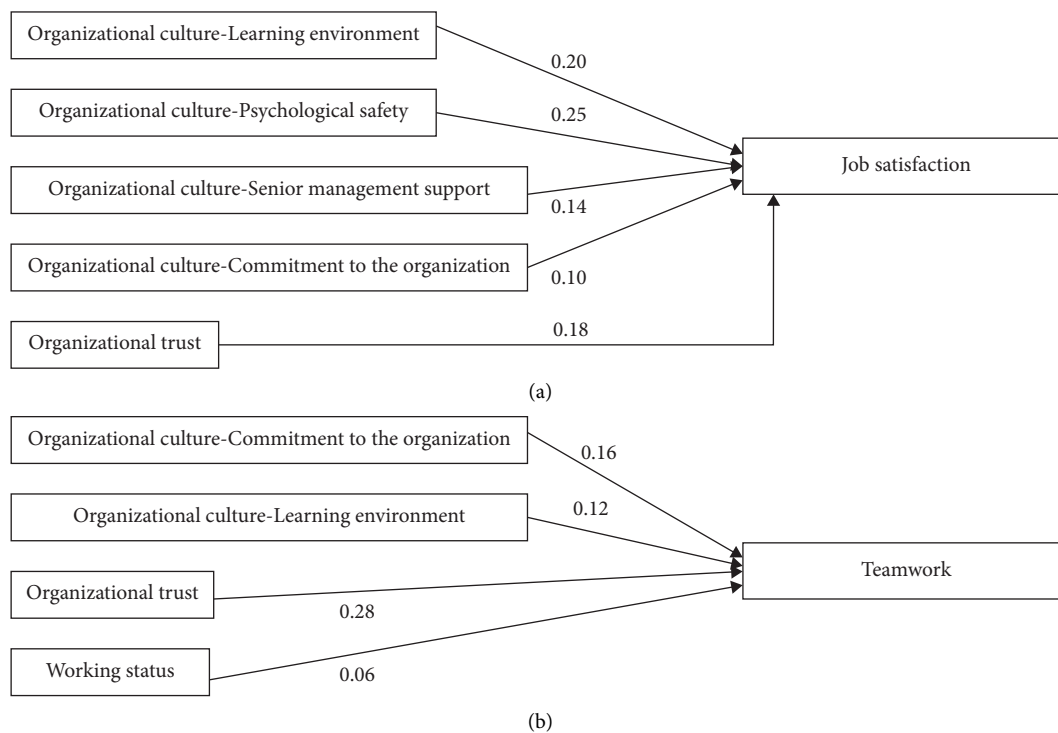


FIGURE 1: Effect of variables on job satisfaction and teamwork.

Furthermore, our study also found that senior management support can increase NPs' job satisfaction, which is supported by previous studies [8, 10]. Senior managers could gain greater insight and provide the necessary support or resources for NPs to deliver care, thereby increasing NPs' job satisfaction. Poghosyan et al. [10] noted that the importance of organizational support, especially higher organizational-level support, was

associated with higher job satisfaction. Eskandari et al. [55] also indicated that nursing leaders or managers were key in creating supportive working environments, which increases job satisfaction. Thus, support from senior managers is essential for the job satisfaction of NPs. On the other hand, senior managers could also implement policies to empower NPs' practice. Senior managers could coordinate with other supervisors or middle managers

and even convince administrators that sufficient empowerment is critical for acute care and that it can improve job satisfaction. Consequently, NPs could practice more efficiently and report better job satisfaction. This finding suggests that it is necessary to encourage NPs to communicate with senior managers and that senior managers should be proactive in empowering NPs at the organizational level of practice by implementing policies to improve job satisfaction.

Moreover, we found that feelings of psychological safety could increase job satisfaction. Psychological safety could be defined as “an individual’s perceptions of the consequences of taking interpersonal risks in a workplace” [56], P. 23). The positive effect of psychological safety on job satisfaction might likely contribute to sufficient support from organizations. The NP system was implemented for over fifteen years in Taiwan, and hospital administrators aware of the scope of practice of NPs and have given them the necessary support for practice [5]. In consequence, NPs perceived greater psychological safety and improved job satisfaction. Therefore, healthcare organizations should continue to support NPs’ practice at the organizational level.

Lastly, our result showed that the greater organization’s commitment, the better job satisfaction was demonstrated. This finding was supported by previous studies documenting that commitment was a significant predictor of job satisfaction [6, 30]. This would be explained that job satisfaction would increase by the greater organizations’ commitment through satisfactory empowerment. According to Meyer and Allen [57], organizational commitment refers to psychological attachment or affective commitment initiated in relation to an individual’s identification and involvement within the organization. NPs with supportive working environments might fully practice their professional role which promotes organizational commitment. Moreover, recent studies had showed that organizational support is a vital factor in enhancing work commitment [58, 59]. Therefore, healthcare organizations are suggested to modify policies to balance the practice rights of NPs and physicians in the collaborative practice model, which might strengthen the organizational commitment and improve job satisfaction of NPs.

Except for organizational culture, the results of our study have revealed the positive effect of organizational trust on job satisfaction. This might be explained by different authorizations of hospitals to allow NP practice [9, 60]. This lack of uniform guidelines of practice may cause conflicts between NPs’ professional roles and hospitals’ regulations, which could lead to limits on NPs’ practice rights. Thus, NPs might not trust hospitals and might therefore have poor job satisfaction [61]. On the contrary, a sufficient organizational trust might enable NPs to perceive their own professional value and enhance job satisfaction [34]. The health department of the government should formulate uniform guidelines of practice to promote the trust relationship between NPs and organizations; hence, NPs would show better job satisfaction.

4.2. Variables Affecting Team-Based Practice. The current study showed that team-based practice was influenced by organizational trust, organizational culture, and the fixed shifts (Figure 1(b)). Above all, organizational trust is essential to improve team-based practice, which was in accordance with previous studies [33, 35, 36]. This might be because organizational trust could improve communication between team members [28, 29]. In Taiwan, NPs mainly work with physicians to deliver team-based care to meet the complex needs of patients [44]; hence, effective communication is vital for team-based care. Ozluk and Baykal [62] noted that healthcare professionals provide care for patients, which requires high concentration in the collaboration process, so even the smallest neglect might lead to patient safety issues. Employees are likely to reciprocate organizational trust through better performance as organizations provide employees with sufficient trust from managers (vertical trust) or coworkers [35]. Consequently, NPs would perceive more organizational trust, which may lead to better team-based practice.

Furthermore, our findings demonstrated that team-based practice was positively influenced by the learning environment. The practice of NPs is complex and improvements in the learning environment such as new skills or sharing information, along with better cooperation with other professional staff are critical for healthcare. A previous review study also noted that there would be beneficial effects for health professionals to experience good learning environments such as teamwork education programs in acute care settings [63]. If organizations focused on building the culture including continuous improvement in the practice, it would encourage NPs to deliver superior performance [64]. Similarly, Engle et al. [65] found that better organizational cultures had links with high performance, and they indicated that some medical centers fostered multidisciplinary approaches, which could facilitate the delivery of both evidence-based practice and patient care. Therefore, they suggested that organizations should enhance the opportunities for interdisciplinary collaboration and the implementation of digital data management to increase the performance of team-based practice in acute care settings.

In addition, our findings also indicated that organizational commitment could increase the effectiveness of team-based practice. We found that organizational culture had direct effects on team-based practice, which were comparable with previous studies [22, 23, 25]. This might be explained by the fact that NPs’ roles were ambiguous in the collaborative care model as they might not be adequately supported. Even though NPs worked with physicians to deliver team-based care and basically followed practice guidelines. Therefore, organizations need to empower NPs with policies to ensure their clinical practice is valued within team-based care and each team member is aligned with his or her responsibility in patient care, which promotes efficient team-based practice.

Lastly, we found that NPs were more likely to demonstrate high efficiency in team-based practice, as they worked on a fixed schedule, which was consistent with previous studies [66, 67]. This result might contribute to the distress

or burnout shift workers experience. Compared to workers with fixed schedules, they reported more frequent burnout, which also leads to circadian rhythm disruption [68]. The rotating shift workers had insufficient rest time, which led to burnout or fatigue [69]. As a result, teamwork care may be compromised. Furthermore, NPs with rotating shift schedules may have to collaborate with many healthcare teams in practice, and this can reduce job satisfaction [70]. Hence, on a fixed working schedule, it is easier to develop positive relationships between team members and better team-based practice. Healthcare organizations are encouraged to schedule NPs on fixed shifts to alleviate the impact of shift work on team-based care.

4.3. Limitations. This study has some limitations. First, as this study had a cross-sectional design, it was not possible to make causal inferences between organizational culture and organizational trust with job satisfaction and teamwork in practice. Nevertheless, our results may be viewed as exploratory, and other researchers might identify distinct motivators or hygiene factors in organizational contexts affecting job satisfaction or teamwork over time. Furthermore, the participants in this study were only recruited from Taiwan, and organizational culture could vary in different countries. Hence, the generalizability of our findings could be limited. The culture difference might also lead to a lower Cronbach's alpha for time for improvement (Cronbach's alpha = 0.61) in the current study. The contents of this subscale might modify for better reliability in future studies. In addition, we used the subscale of NP-PCOCQ to measure teamwork, and it was not designed to be a standalone tool to measure teamwork. However, patients' healthcare mainly relied on the collaboration between NPs and physicians in Taiwan, such collaboration would reflect the performance of teamwork. Future studies would conduct a unique tool for measuring teamwork in studies. Finally, there might be a response bias due to the self-completed questionnaire design. Despite these limitations, this study has uncovered the influence of organizational context on both job satisfaction and team-based practice using a national-based survey in Taiwan.

5. Conclusion

Organizational culture and trust were key for improvements in job satisfaction and team-based practice. The learning environment and organizational trust were the two most influential factors in job satisfaction and team-based practice, respectively. Hospitals could establish a supportive atmosphere of practice using an appropriate organizational culture and providing sufficient trust to promote both NPs' job satisfaction and team-based practice. Also, because the effects of organizational culture and trust on job satisfaction and team-based practice have not been studied previously in a national sample, our results provide a foundation to fill the knowledge gap in this field and to develop future studies.

6. Implication for Nursing Management

Continuing to improve the organizational culture and trust of NPs is critical to enhancing NPs' job satisfaction and teamwork in acute care practices. In the process, hospital administrators are encouraged to develop and implement policies to enrich supportive organizational cultures, such as enhancing the learning environment and building up an interdisciplinary collaboration that could improve job satisfaction and team-based care. Moreover, empowering NPs in practice at the organizational level and encouraging communication with senior managers are beneficial for increasing NPs' psychological safety and gaining the support of senior managers.

It is also suggested that acute care hospitals need to implement policies to ensure the rights of NPs in the collaborative practice model, which therefore might improve job satisfaction and efficiency of the team-based practice. In particular, authorized practice guidelines might strengthen organizational trust in acute care settings, which promotes better job satisfaction and proficient team-based practice.

Data Availability

The data used to support the findings of this study are available on request from the author.

Ethical Approval

The study was approved by the Institutional Review Board (IRB) of the China Medical University Hospital (CMUH111-REC3-059).

Disclosure

We shared a small part of the information with a poster presentation at the research conference of the International Council of Nurses in July, 2023.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Organizational Learning and Primary Care Nurses' Work Performance and Well-Being: A Multilevel Linear Analysis in a Developing Country

Ruixue Zhao ¹, Wenhua Wang ¹, Jinnan Zhang ¹, Mengyao Li ¹,
Stephen Nicholas ^{2,3}, Elizabeth Maitland ⁴, Huiyun Yang ¹ and Rebecca Mitchell ⁵

¹School of Public Policy and Administration, Xi'an Jiaotong University, Xi'an, China

²Australian National Institute of Management and Commerce, Sydney, Australia

³Health Services Research and Workforce Innovation Centre, Newcastle Business School, University of Newcastle, Newcastle, Australia

⁴School of Management, University of Liverpool, Liverpool, UK

⁵Health and Wellbeing Research Unit (HoWRU), Macquarie Business School, Macquarie University, Sydney, Australia

Correspondence should be addressed to Wenhua Wang; wenhua.wang@mail.mcgill.ca and Rebecca Mitchell; rebecca.mitchell@mq.edu.au

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Aim. This study aims to investigate the level of organizational learning within urban Chinese Community Health Centres and reveal its potential association with primary care nurses' work performance and well-being. **Background.** Globally, there is a push to establish learning healthcare systems for complex health reform challenges. Existing studies on organizational learning mainly focus on North American and European hospital settings, offering limited insights into primary care environments, particularly in developing countries. **Design.** Cross-sectional study. **Methods.** We recruited 175 nurses from 38 community health centres in four Chinese cities (Shanghai, Shenzhen, Tianjin, and Jinan) using convenience sampling. Trained research assistants conducted face-to-face surveys, measuring organizational learning with the Learning Orientation Scale. Nurse-level outcomes included self-directed learning, quality of care, organizational commitment, and work stress. Data analysis employed multilevel linear modelling. **Results.** The 38 community health centres displayed a relatively high level of organizational learning, and there was a positive and significant association between organizational learning within community health centres and nurses' self-directed learning as well as the quality of care. However, there was no significant association between organizational learning and nurses' organizational commitment or work stress. **Conclusion.** This study demonstrates a high-level organizational learning capacity in urban community health centres in China. It provides a new perspective on the potential relationship between CHCs' organizational learning and primary care nurses' well-being and work performance. Further research is needed to clarify unexpected findings and identify factors promoting organizational learning in primary care settings. **Implications for Nursing Management.** In China's evolving primary care system, nurses play a vital role amidst physician shortages. Policy should prioritize internal management reform alongside structural changes. This study highlights the importance of fostering organizational learning in primary care settings. Strategic interventions should promote a learning culture in CHCs, which may enhance nurses' self-directed learning and improve the quality of care.

1. Introduction

Today's healthcare systems operate in an uncertain, turbulent, and interconnected environment, facing constant pressure from policymakers, healthcare

analysts, and funders to provide quality healthcare while also maintaining operational efficiency and cost-effectiveness [1]. Internationally, there are reform initiatives aimed at establishing high-performing primary care delivery models, such as the Patient-Centred

Medical Homes (PCMHs) and Accountable Care Organizations (ACOs) in the United States [2], Family Health Teams and Family Medicine Groups in Canada [3], and Family Doctor Teams in China [4].

The ever-shifting demographics, evolving political priorities, and ongoing financial concerns continually introduce new challenges into the healthcare landscape, meaning that these current reform initiatives have a finite lifespan. One healthcare constant is the system's ability to adapt and respond effectively to these changing conditions and evolving patient needs [5]. This adaptation requires ongoing experimentation and a commitment to change, reliant on the internal capacity for organizational learning and development [6]. For example, a recent study in the UK examined how a large healthcare organization responded to complex and disruptive changes, notably during the recent pandemic. The study revealed that the organization transformed into a learning organization, which is a critical factor for effectively addressing disruptive changes and facilitating postpandemic organizational recovery [7].

Scholars hold diverse perspectives on organizational learning. Some argue that organizational learning takes place when members of an organization act as learning agents, responding to changes in the organization's internal and external environments by detecting and correcting errors in the organization's theory in use [8]. The concept of organizational learning also can be traced back to the idea of transferring learning from one person to another, as put forth by Taylorism, with the aim of enhancing organizational efficiency, development, and performance. This dynamic process enables employees to swiftly adapt to changes and promotes the development of new behaviours and skills within the organization [9].

In the healthcare sector, prominent institutions such as the National Academy of Medicine (NAM), the National Institutes of Health (NIH), and the Agency for Healthcare Research and Quality (AHRQ) are advocating for healthcare organizations to transform into "learning healthcare systems" (LHSs). The LHS concept emphasizes the need for healthcare organizations to adopt a more systematic and data-driven approach to generate and leverage knowledge, ultimately improving the quality and value of the care they provide while fostering innovation [10].

Proficiency in organizational learning is imperative for attaining a high level of reliability in a dynamic healthcare environment [11]. Through the practice of organizational learning, healthcare teams can consistently deliver safe, efficient, and high-quality care in the midst of a complex and ever-evolving environment [12]. Nurses, the largest group involved in healthcare delivery, hold a critical role in establishing caring and therapeutic relationships with patients [13]. They serve as pivotal sources for knowledge transfer within healthcare organizations, making them instrumental in the process of organizational learning [13]. In China, primary care nurses are increasingly assuming healthcare responsibilities that extend beyond their traditional roles. Nurses assist physicians, provide clinical follow-up care and home nursing, and manage patients' electronic health records. This expanded role is particularly crucial in the context of an aging population, the growing

prevalence of chronic conditions and mental health issues, and new challenges like those posed by the COVID-19 pandemic [14]. Organizational learning is arguably important for the effective management of nurses during periods of transition [15].

Within the healthcare literature, researchers have extensively examined the antecedents, contextual factors, and mechanisms of organizational learning across multiple dimensions, including individuals, organizations, and the environment [16–18]. However, there has been relatively limited exploration of organizational learning outcomes [19]. Most existing studies focusing on the outcomes of organizational learning have centred around the hospitals [20, 21]. There is a dearth of information regarding organizational learning and its associated outcomes within primary care settings, particularly in developing countries such as China [22]. Furthermore, there is minimal information about the influence of organizational learning on primary care nurses' work performance and well-being in China.

This study bridges the existing knowledge gap by shedding light on the level of organizational learning within community health centres (CHCs) in urban China, a vital component of the country's primary care landscape. Furthermore, it analyses the relationship between organizational learning within CHCs and the well-being and work performance of primary care nurses as they adapted to change healthcare demands. These new insights inform policies and strategies aimed at enhancing the resilience and effectiveness of China's primary healthcare delivery in the face of dynamic challenges.

2. Methods

2.1. Study Design. This study conducted a cross-sectional, in-person survey of nurses working in CHCs in China from November 2020 to May 2021.

2.2. Study Setting and Sampling. This study gathered data from Shanghai, Shenzhen, Tianjin, and Jinan, where well-established primary care systems boast enhanced infrastructure and a cadre of primary care professionals. This information could prove valuable in steering further reforms in primary care across these cities and regions in China. Given the variations in practice size and patient volumes in the four cities, a convenience sampling approach was employed, resulting in 38 selected CHCs with 10 in Shanghai, 14 in Shenzhen, 8 in Tianjin, and 6 in Jinan [14]. For each CHC, all nurses on duty on the day when the researchers arrived were invited to participate in the survey. A total of 175 primary care nurses from 38 CHCs, with an average of 4–5 nurses per CHC, completed the nurse survey. The survey gathered information on the nurses' personal characteristics, self-directed learning, self-reported quality of care, organizational commitment, and work stress. Data were also collected from the directors of each CHC through a primary care organization survey, focusing on organizational learning and organizational characteristics.

To ensure data quality and reliability, stringent quality control measures were implemented at various stages of the survey. Initially, experts meticulously refined the questionnaire for clarity and precision, ensuring logical consistency throughout. A presurvey was conducted to identify and address any areas for improvement. During the data collection phase, surveyors underwent comprehensive training, while nurses were briefed on the questionnaire. Real-time support was provided to nurses, and on-site checks were carried out to verify the accuracy and completeness of the responses. Following the survey, a double-entry data entry method was employed to minimize errors, followed by thorough data cleaning procedures to enhance accuracy and ensure quality assurance.

2.3. Measures and Variables

2.3.1. Organization-Level Variables. Learning orientation can be considered the wellspring of core organizational values that influence the organization's propensity to generate and apply knowledge [8]. It plays a pivotal role in shaping the organization's satisfaction with its current operational theories, thereby affecting the extent of proactive learning [8]. A stronger learning orientation indicates a greater willingness and capacity for the organization to learn [23, 24]. Three organizational values regularly associated with the organization's inclination to learn are commitment to learn, open-mindedness, and shared vision [8].

Commitment to learn refers to the fundamental value held by an organization towards learning, representing the dedication and emphasis on fostering a learning culture. Open-mindedness refers to the organization's willingness and ability to question and challenge existing mental models, beliefs, assumptions, and routines. Shared vision entails a common and collectively agreed-upon direction or goal that guides the organization's learning and actions, providing a clear sense of purpose.

In this study, we adopted the Learning Orientation Scale developed by Sinkula et al. [8], with certain modifications to better suit the environment of primary care in China. Subsequently, we assessed organizational learning within 38 CHCs. Measured using a 5-point Likert scale (ranging from 1 "strongly agree" to 5 "strongly disagree"), specific items for each aspect are detailed in Table 1.

2.3.2. Nurse-Level Variables. As shown in Table 2, our measure of self-directed learning utilized three items from the study of Yang et al. [25], self-directed learning scale among nurses. Based on the previous research studies [26], the quality of care reported by nurses was assessed using the question provided in Table 2.

Drawing on the Allen and Meyer organizational commitment model, these were designated as "affective," "continuance," and "normative" commitment. Employees with strong affective commitment remain with the organization because they genuinely want to; those with strong continuance commitment stay because they feel a need to do

so; individuals with strong normative commitment remain committed because they feel a sense of moral or ethical obligation to stay [27]. Our modified and contextualized organizational commitment scale was based on Allen and Meyer [27], with six positively worded items listed in Table 2.

Work stress variables in Table 2 are based on Cavanaugh's concepts of challenge stressors and hindrance stressors [28]. Challenge stress refers to a series of stressors that positively influence employees' skill enhancement and career development, while hindrance stress refers to stressors that negatively affect employee career development and personal growth [29].

2.3.3. Control Variables. As shown in Table 3, control variables were collected, including nurse-level variables such as age, sex, education level, and years of working experience. In addition, organization-level control variables were gathered, consisting of types of organization ownership (government-managed CHCs and hospital-managed CHCs), accreditation status (accredited by national or provincial health authorities or not), and organization size (number of staff).

2.4. Ethical Considerations. The study was approved by the Biomedical Ethics Committee of the Medical Department of Xi'an Jiaotong University (No. 2020-1344). All methods that we used adhered to the accepted guidelines for ethical reporting.

2.5. Statistical Analysis. The analytic approach involved several stages. First, Cronbach's alpha coefficients were employed to assess the internal consistency of the scales. Descriptive statistics were then utilized to provide an overview of the sample characteristics and the main variables. The Spearman rank correlation coefficient was employed to explore the relationship between organizational learning and the four nurse-level variables. Subsequently, with nurse-level data nested within the organization-level data, we constructed four 2-level hierarchical linear regression models (nurses at level 1, nested within the CHCs at level 2) to investigate whether organizational learning of CHCs influence nurse-level variables [30]. The data were analysed using Stata 15/SE.

3. Results

3.1. Characteristics of the Participants. Table 3 presents the descriptive statistics on 175 nurses. The average age of nurses is 34.93 years, ranging from 22 to 61 years; most nurses were female, accounting for 98.29% of the sample, and 93.10% of nurses had attended junior college or college. Nurses had an average of 11 years of work experience. Their tenure ranged from 0.2 to 40 years. Among the CHCs, 60.53% were government-managed and 39.47% were under the management of public hospitals. In addition, 57.89% of CHCs were accredited by national or provincial health authorities.

TABLE 1: Organization-level variables and measurement items.

Variables	First-order factors	Measurement items
Organizational learning	Commitment to learning	Managers basically agree that our organization's ability to learn is the key to our competitive advantage
		The basic values of this organization include learning as a key to improvement
		The sense around here is that employee learning is an investment, not an expense
		Learning in my organization is seen as a key commodity necessary to guarantee organizational survival
		The organizational culture of our organization does not regard employee learning as a top priority ^a
	Open-mindedness	"Once we stop learning, the future will be in danger" is the consensus of this organization
		We have a clearly defined concept of the organization's positioning and future development
		Each department and section of the organization has a common organizational vision
		All employees of the organization are committed to the achievement of organizational goals
		Heads of departments and departments in the organization share their vision with their subordinates
Shared vision	The organization does not have a clear and articulated vision ^a	
	The employees of the organization feel that they are responsible for the future direction of the organization	
	The organization is not afraid of us to question its various assumptions about operation and management	
	Heads of departments and sections do not like to have their views questioned ^a	
	The organization considers it important to be inclusive of diverse voices	
		Our employees are encouraged to think beyond the norm and creatively
		The organizational culture of the organization does not emphasize continuous innovation ^a
		This organization places great importance on originality

Note. Items were measured using 5-point scales (1 = strongly disagree and 5 = strongly agree). ^aReverse-coded item.

Furthermore, 34.21% of CHCs had 35 or fewer employees, while 28.95% had more than 100 employees.

3.2. Reliability and Scores of Variables. Table 4 displays Cronbach's alpha for each variable scale, along with the mean and standard deviations of the variables. These variables include organizational learning (composed of three first-order factors) and four nurse-level dependent variables.

Reliability refers to the consistency and stability of results obtained when using the same measurement tool. In this study, the reliability of the measurement tools for variables was assessed using Cronbach's alpha. A higher Cronbach's alpha value indicates greater reliability of the scale. The research study suggests that a Cronbach's alpha value greater than 0.9 indicates very good reliability, while $0.7 < \text{Cronbach's alpha} < 0.9$ indicates good reliability. Cronbach's alpha of the Learning Orientation Scale was 0.88 (with commitment learning at 0.74, shared vision at 0.81, and open-mindedness at 0.72), the Self-Directed Learning Scale was 0.83, the Organizational Commitment Scale was 0.94, and the Work Stress Scale was 0.85. These Cronbach's alpha values collectively indicate a high level of internal consistency among the items and suggest that the measurement tools used in this study are reliable, providing consistent results across the variables assessed.

The average organizational learning score for the 38 CHCs was 4.09 out of 5, indicating a high level of organizational learning. Specifically, the mean score for commitment learning was 4.25, 4.07 for shared vision and 3.96 for open-mindedness out of 5. There were differences between the three components that constitute organizational learning: the average score for self-directed learning was 4.16 (SD 0.72), quality of care was 3.17 (SD 0.54), organizational commitment was 4.04 (SD 0.88), and work stress was 3.39 (SD 0.96).

3.3. Correlation Analysis. Table 5 presents the correlation matrix for the main variables. The findings reveal that organizational learning exhibits positive correlations with self-directed learning ($r = 0.179$, $P < 0.05$), quality of care ($r = 0.145$, $P < 0.10$), and organizational commitment ($r = 0.149$, $P < 0.05$). However, no significant correlations were observed between organizational learning and work stress. These results suggest that higher levels of organizational learning were associated with increased self-directed learning, improved quality of care, and greater organizational commitment among the nurses.

3.4. Multilevel Linear Analysis. Reliability diagnosis of the multilevel ordinal logit model was conducted by calculating the intraclass correlation coefficient (ICC), which ranges

TABLE 2: Nurse-level variables and measurement items.

Variables	Response categories	Measurement items
Self-directed learning	Likert 5-point scale 1 = strongly disagree and 5 = Strongly agree	You actively participate in all kinds of training and strive to improve the level of business and the quality of care You use your spare time to enrich your medical knowledge and improve your professional level You consciously and humbly learn from other highly skilled medical professionals
Quality of care	Likert 4-point scale 1 = not good 2 = moderate 3 = good 4 = excellent	How do you assess the quality of care you provide to patients within this institution?
Organizational commitment	Likert 5-point scale 1 = strongly disagree 5 = strongly agree	I have deep affection for the people and events of this organization I would be very happy to spend the rest of my career with this organization I feel obligated to remain with the organization I really feel as if this organization's problems are my own This organization has a great deal of personal meaning for me I do feel a strong sense of belonging to my organization
Work stress	Likert 5-point scale 1 = Strongly disagree 5 = Strongly agree	The number of projects and tasks I must complete at work is large The volume of work that I must accomplish in the allotted time is heavy

TABLE 3: Description of nurses and organizational characteristics.

Characteristics	Mean \pm SD (range) or <i>n</i> (%) (units)
Nurse level (<i>n</i> = 175)	
Age	34.93 \pm 7.79 (22–61) (years)
Sex	
Male	3 (1.71)
Female	172 (98.29)
Education level	
High school or below	12 (6.90)
Junior college/college	163 (93.10)
Years of working experience	11 \pm 8.56 (0.2–40) (years)
Organizational level (<i>n</i> = 38)	
Organizational ownership	
Government	23 (60.53)
Public hospital	15 (39.47)
Accredited	
No	16 (42.11)
Yes	22 (57.89)
Organizational size	
\leq 35	13 (34.21) (employees)
36–55	7 (18.42) (employees)
56–100	7 (18.42) (employees)
>100	11 (28.95) (employees)

Note. The nurse data nested within 38 CHCs. Organizational ownership: government-managed CHCs or hospital-managed CHCs. Accredited: accredited by national or provincial health authorities or not. Organizational size: number of all staff.

TABLE 4: Main variables, Cronbach's alpha, and questionnaire score.

Variables	Item numbers	Cronbach's alpha	Mean	SD
Organizational learning	18	0.88	4.09	0.52
Commitment learning	6	0.74	4.25	0.60
Shared vision	6	0.81	4.07	0.59
Open-mindedness	6	0.72	3.96	0.61
Self-directed learning	3	0.83	4.16	0.72
Quality of care	1	—	3.17	0.54
Organizational commitment	6	0.94	4.04	0.88
Work stress	2	0.85	3.39	0.96

Note. SD: standard deviation.

TABLE 5: Correlation matrix of the main variables.

Variables	Organizational learning	Self-directed learning	Quality of care	Organizational commitment
Organizational learning				
Self-directed learning	0.179**			
Quality of care	0.145*	0.272***		
Organizational commitment	0.149**	0.507***	0.266***	
Work stress	-0.105	0.018	0.076	-0.154**

Note. * $P < 0.10$; ** $P < 0.05$; *** $P < 0.001$.

from 0 to 1, to ensure the model's suitability for our analysis. If the ICC value exceeded 0.059, it indicated the necessity of performing a multilevel model for data analysis. The intraclass correlation coefficient (ICC) shows clustering effects, with the ICC values of 0.123 for self-directed learning, 0.060 for quality of care, 0.219 for organizational commitment, and 0.094 for work stress. These ICC values suggest that a significant portion of the variability in the dependent variables can be attributed to differences between CHCs. Using multilevel linear models is an appropriate

approach to examine how the nurse characteristics are influenced, not only at the individual level but also at the CHC level, variables.

Table 6 presents the results of the multilevel linear models examining the relationship of organizational learning on nurse characteristics in CHCs. The key organizational variable, organizational learning, shows a positive and significant association with self-directed learning ($\beta = 0.272$, $P < 0.05$) and quality of care ($\beta = 0.234$, $P < 0.05$). The association with organizational commitment was not

TABLE 6: Multilevel linear models examining the association between organizational learning and nurses' variables.

Parameters	Self-directed learning			Quality of care			Organizational commitment			Work stress		
	β	SE	P value	β	SE	P value	β	SE	P value	β	SE	P value
Intercept	2.489***	0.707	<0.001	2.194***	0.532	<0.001	1.951**	0.969	0.044	4.066***	0.975	<0.001
Key organizational variable												
Organizational learning	0.272**	0.119	0.022	0.234**	0.087	0.007	0.265	0.183	0.146	-0.226	0.167	0.175
Control variables												
Nurse level												
Age	0.001	0.013	0.971	-0.001	0.01	0.921	0.008	0.015	0.578	0.002	0.017	0.909
Sex (ref = male)												
Female	0.164	0.397	0.680	-0.147	0.308	0.632	0.278	0.466	0.551	0.183	0.539	0.734
Education level (ref = high school or blow)												
Junior college/college	0.280	0.208	0.177	0.150	0.161	0.349	0.135	0.247	0.585	-0.043	0.283	0.879
Years of working experience	0.009	0.011	0.381	-0.001	0.009	0.960	0.011	0.014	0.419	0.017	0.016	0.265
Organizational level												
Organizational ownership (ref = government)												
Public hospital	-0.068	0.162	0.676	-0.054	0.115	0.640	0.016	0.262	0.950	-0.294	0.231	0.201
Accredited (ref = no)												
Yes	-0.105	0.127	0.407	0.011	0.092	0.906	-0.099	0.198	0.617	0.139	0.181	0.443
Organizational size (ref = ≤35)												
36-55	0.366**	0.177	0.039	0.110	0.128	0.390	0.339	0.277	0.221	0.234	0.248	0.347
56-100	0.022	0.203	0.913	0.221	0.145	0.129	0.449	0.326	0.169	-0.337	0.286	0.239
>100	0.104	0.187	0.578	0.041	0.134	0.759	0.194	0.301	0.519	-0.326	0.267	0.222
ICC		0.123		0.060			0.219				0.094	
AIC	(377.013)	375.851		(290.889)	287.867		(444.730)	448.611		(477.673)	480.625	

Note. β : coefficient; SE: standard error; ICC: intraclass correlation coefficient; AIC: Akaike Information Criteria. AIC values in parentheses represent the AIC of the null model. ** $P < 0.05$; *** $P < 0.001$.

statistically significant ($\beta = 0.265$, $P = 0.146$), and there was a negative but nonsignificant association with work stress ($\beta = -0.226$, $P = 0.175$). Among the control variables, none of the nurse-level variables (age, sex, education level, and years of working experience) show statistically significant associations with any of the dependent variables (self-directed learning, quality of care, organizational commitment, and work stress). Regarding organizational level variables, organizational ownership and accreditation do not have statistically significant associations with the dependent variables. However, organizational size showed a significant association with self-directed learning (36–55 employees: $\beta = 0.366$, $P < 0.05$).

The Akaike Information Criterion (AIC) values were computed for both the full models and the null models, which included only the intercept. The AIC value for the full model, including both organizational learning and control variables, is 375.851, while the AIC for the model considering only self-directed learning is 377.013. Similarly, the AIC value for the full model, including both organizational learning and control variables, is 287.867, whereas the AIC for the model including only quality of care is 290.889. Notably, the AIC values of the full models were lower than those of the null models, indicating that the full models provided a better fit.

On the contrary, the AIC value of the null model containing only organizational commitment (AIC: 444.730) is lower than that of the full model including organizational learning and control variables (AIC: 448.611). Similarly, the AIC value of the null model containing only work stress (AIC: 477.673) is also lower than that of the full model (AIC: 480.625). These findings suggest that incorporating organizational learning and other control variables did not enhance the fit of these models; instead, it worsened. This suggests that the variable of organizational learning may not significantly improve the explanatory power of these models.

Table 7 presents the results of the multilevel linear models examining the three first-order factors of organizational learning and their associations with nurse characteristics in CHCs. Commitment to learn shows positive and significant associations with self-directed learning ($\beta = 0.229$, $P < 0.05$) and self-reported quality of care ($\beta = 0.178$, $P < 0.05$), while it exhibits a positive, but not statistically significant, association with organizational commitment ($\beta = 0.207$, $P = 0.188$). There was a significant negative correlation between commitment to learn and nurses' work stress ($\beta = -0.326$, $P < 0.05$), suggesting that higher organizational commitment to learn is related to lower perceived work stress among nurses. Shared vision demonstrates a positive and significant association with self-reported quality of care ($\beta = 0.195$, $P < 0.05$). However, it does not show statistically significant associations with organizational commitment, self-directed learning, or work stress. Open-mindedness was only significantly and positively associated with self-directed learning ($\beta = 0.169$, $P < 0.10$). Overall, the results suggest that different dimensions of organizational learning (commitment to learn, shared vision, and open-mindedness) have varying impacts on nurse characteristics in CHCs.

4. Discussion

Our research findings revealed that 38 urban Shanghai, Shenzhen, Tianjin, and Jinan CHCs demonstrated a high level of organizational learning, with a particular emphasis on commitment to learn, followed by shared vision and open-mindedness. Nurse managers in New South Wales, Australia, stroke units also reported a high level of organizational learning culture [31]. In our study, strong organizational learning within these CHCs emerged as a significant predictor of nurses' self-directed learning and the quality of care they reported. There was no observed correlation between this organizational learning and nurses' levels of organizational commitment or work stress.

Organizational learning is viewed as a dynamic knowledge-based process, involving a fluid transition between various levels of action, spanning from individual to group, and further to the organizational level, and vice versa [32]. Therefore, the investigation into the relationship between organizational-level organizational learning and individual-level self-directed learning is of paramount importance. The previous research study has indeed examined various relationships between different variables and self-directed learning, including factors such as self-efficacy, organizational support, performance, and problem-solving ability [33–35]. However, there has been comparatively less emphasis on investigating the connection between organizational learning and nurses' self-directed learning.

Although not specifically focused on the nurse population, the four studies collectively offer valuable insights into the practices and impacts of organizational learning and self-directed learning across diverse contexts, yielding results consistent with this study: the first study explored the implementation of Senge's five disciplines of learning organization within an innovative motorcycle manufacturing company in Indonesia. It demonstrated that integrating these disciplines into daily work-life fosters self-directed learning among employees, emphasizing the importance of shared vision, personal mastery, team learning, and systems thinking [36]. The second study, involving a survey of 175 members of Civil Defence Emergency Preparedness Teams in South Korea, highlighted the positive influence of organizational learning on members' self-directed learning [37]. In the third study, which included 745 participants from 20 private universities, findings indicated a direct and positive relationship between organizational learning culture and self-directed learning [38]. Lastly, the fourth study focused on 521 public librarians in Seoul, Incheon, and Gyeonggi-Do, examining the impact of organizational learning readiness on their perceived self-directed learning ability. The study proposed strategies for enhancing organizational learning readiness to improve self-directed learning outcomes [39]. These studies collectively support the result of this study, emphasizing the significant role of organizational learning practices in promoting self-directed learning across various professional settings.

We defined self-directed learning as the ongoing enhancement of personal clinical expertise and medical knowledge. This underscores the critical importance of

TABLE 7: Multilevel linear models examining the association between organizational learning's three first-order factors and nurses' variables.

Three first-order factors of organizational learning	Self-directed learning			Quality of care			Organizational commitment			Work stress		
	β	SE	<i>P</i> value	β	SE	<i>P</i> value	β	SE	<i>P</i> value	β	SE	<i>P</i> value
Commitment to learning	0.229**	0.098	0.020	0.178**	0.070	0.011	0.207	0.157	0.188	-0.326**	0.123	0.008
Shared vision	0.177	0.109	0.105	0.195**	0.078	0.012	0.262	0.161	0.103	-0.043	0.153	0.780
Open-mindedness	0.169*	0.099	0.089	0.119	0.075	0.110	0.122	0.153	0.425	-0.121	0.139	0.388

Note. The control variables remain the same as in Table 6. * $P < 0.10$; ** $P < 0.05$.

fostering a culture of organizational learning within CHCs. Our study found that nurses working in CHCs with a high level of organizational learning, particularly in terms of commitment to learn, were more likely to report elevated levels of self-directed learning. This observation highlights the potential link between organizational learning culture and nurses' ability to take charge of their own learning and professional development. This research study can illuminate the mechanisms through which nurses can leverage their organization's knowledge resources to enhance their personal learning and professional development.

In a study conducted in 2022 among healthcare department employees in Pakistan, it was discovered that the presence of an organizational learning culture exerted a positive and substantial influence on employee performance [40]. Learning organizations provide nurses with the opportunity to enhance the feedback mechanism for staff performance [41]. Furthermore, the concept of organizational learning has long been recognized as a pivotal factor determining an organization's sustained performance [19]. The relationship between healthcare quality and performance is well-established [42], prompting an exploration of whether organizational learning can impact healthcare quality from a novel standpoint. While extensive research has delved into the factors influencing healthcare quality [43, 44], there remains a conspicuous dearth of comprehensive information concerning the connection between organizational learning and healthcare quality.

Although the literature review did not find exact evidence of the relationship between organizational learning and care quality, we found several studies on the correlation between organizational learning and patient safety. Patient safety culture is crucial within healthcare systems as it significantly impacts the quality of care provided. A study involving 101 oncology nurses from two large Saudi tertiary care hospitals found that organizational learning positively influences patient safety culture [45]. Another study aimed to examine safety culture among registered nurses in four tertiary care hospitals in Thailand. Findings revealed that continuous improvement in organizational learning positively impacts safety culture [46]. Recent research indicates that a hospital has effectively enhanced nurses' theoretical knowledge and stabilized their practical skills. This was achieved by utilizing a nurse training system grounded in the principles of a learning organization. The system encompasses strategies such as comprehensive training, continuous management, and team learning. Consequently, the hospital has seen a reduction in the incidence of adverse nursing events [47]. Overall, these studies highlight the importance

of promoting organizational learning for patient safety in healthcare settings. Our study revealed that nurses operating within CHCs characterized by a high level of organizational learning, especially in terms of commitment to learn and shared vision, are more inclined to report a high level of quality care. Consequently, this study offers a fresh perspective on enhancing the quality of care provided by nurses through the establishment of a learning organization.

Our study also introduced a novel perspective regarding the relationship between nurses' organizational commitment and organizational learning. Prior research has frequently indicated that organizational learning or specific dimensions encompassed within organizational learning significantly impact organizational commitment. For example, Yafang found a notable positive correlation between the presence of a "learning organization" and organizational commitment [48]. Darban et al. found that shared vision allowed nurses to align their activities with the organization's goals and direction, thereby enhancing their commitment to the organization [49]. On the other hand, studies conducted in China focusing on hospital nurses yielded the following findings: one demonstrated that training had a positive impact on organizational commitment, while another study revealed a positive correlation between nurses' job satisfaction, psychological empowerment, and organizational commitment [50, 51]. While there may be differences between hospital environments and primary healthcare environments, potentially leading to varying research outcomes, these two studies provide us with a hint that, at present, nurses may be more influenced by fundamental working conditions and resources, such as training opportunities, job satisfaction, and psychological empowerment, rather than organizational learning, regarding organizational commitment. In conclusion, the absence of a significant impact of organizational learning on the organizational commitment of primary care nurses represents a complex outcome. To gain a deeper understanding of this issue, further research is necessary to explore the interplay of these factors.

While the previous research study has predominantly focused on identifying factors associated with work stress, including but not limited to emotional exhaustion, depersonalization, personal accomplishment [52], working hours per week, and anxiety [53], most studies have concentrated on understanding which elements or stressors have negative effects on individuals. Not all stressors have adverse effects on individuals or organizations, despite increasing strains or demands. To yield positive outcomes, managers should aim to eliminate hindrance stressors while

concurrently introducing challenge stressors within the workplace [54]. Our study represents a relatively novel exploration into the relationship between organizational learning and work stress. We conceptualized work stress as a set of stressors that positively contribute to the enhancement of nurses' skills and career development. Our study findings indicate that, aside from the "commitment to learn" dimension, the organizational learning and the other two dimensions had no statistically significant impact on nurses' work stress. The lack of a significant influence of organizational learning on nurses' work stress in China's primary healthcare settings may be attributed to various factors. These factors could include cultural differences, organizational support, or specific job demands. However, this study underscores the importance of continued exploration of organizational learning's role in enhancing nurses' career development and the quality of care within the evolving landscape of China's primary care system.

In addition to the aforementioned interpretation within the context of the wider literature, the findings of this study are also of significance to other regions and globally. Research on "learning organizations" within the health sector is predominantly focused on high-income countries and hospital settings, with only limited studies examining primary healthcare facilities, especially in low- and middle-income countries [55]. This study, targeting CHCs in China, presents an empirical case illustrating a potential pathway to enhance the quality of care in resource-limited environments through improved organizational learning levels. It offers a model that can be replicated by countries with similar contexts.

Countries with similar healthcare constraints, such as resource limitations and high patient loads—common in regions including Cameroon where nurses face significant emotional strain due to heavy patient burdens—can benefit from the insights gained through this study [56, 57]. Specifically, the implementation of structured learning environments and continuous feedback mechanisms can be adapted to local contexts. Moreover, in other regions, it could further validate the effectiveness of organizational learning frameworks in different cultural or healthcare settings.

The benefits of adopting learning organization frameworks extend beyond developing countries. For example, a study in Canada found that such frameworks positively impact daily nursing tasks [58], corroborating the findings of this study that emphasize the importance of career development and supportive learning environments in enhancing medical service quality. These findings underscore the universal applicability of learning organizations in both developing and developed settings.

Since 2012, the United Nations General Assembly has called on governments worldwide to advance towards Universal Health Coverage (UHC). A pivotal recommendation for UHC is that countries engage in ongoing learning [55]. Research studies have confirmed that adopting learning organizations is recognized as a strategic approach to improve knowledge management and promote continuous professional growth within healthcare sectors globally [58].

Therefore, the results of this study should encourage global health policymakers to intensify their focus on and explore effective strategies for fostering an organizational learning culture, which could substantially contribute to achieve universal health coverage.

4.1. Strengths and Limitations. The following limitations should be noted when interpreting our findings: First, this study is cross-sectional, confirming associations between CHCs' organizational learning and nurse-level variables rather than establishing causation. Our research team is preparing to conduct in-depth longitudinal investigations focusing on organizational learning in CHCs in the next few years to explore the causal relationship between organizational learning and nurse variables. Second, we recruited 175 nurses from 38 CHCs in four large cities. The primary care organization in these cities, including infrastructure building and primary care professionals, is relatively well established. While our results provide valuable information for further primary care reform in these well-developed cities in China, they may not necessarily be generalizable to other primary care settings. Future research should explore the generalizability of our findings across diverse healthcare systems and contexts. Third, CHCs selection was based on convenience rather than randomness. However, during sampling, we considered variations in practice size, patient volumes, and CHC ownership in each city to enhance the relative representativeness of CHCs and nurses. This approach may have potentially compromised the representativeness of the sample and introduced additional biases. Future research endeavours should consider employing more rigorous sampling techniques to enhance the reliability of the findings. Fourth, despite implementing quality control measures, reliance on self-reported data may introduce response bias and subjectivity. Future research should develop context-based primary care quality indicators for objective data collection.

While we have acknowledged several limitations to this study, our research significantly narrows the understanding gap regarding organizational learning within primary care, especially in developing countries. It establishes a notable association between CHCs' organizational learning and primary care nurses. This study offers a fresh perspective on enhancing nurses' personal self-directed learning and improving the quality of care provided by nurses through the establishment of a learning organization. It identifies promising areas for further investigation, making a relevant contribution to the fields of primary care and healthcare quality improvement.

5. Conclusion

This research examined 38 urban CHCs, revealing a strong level of organizational learning, with a focus on commitment to learning, shared vision, and open-mindedness. This study also explores the relationship between organizational learning and the well-being and work performance of primary care nurses, broadening our understanding of the role

of organizational learning in primary care by highlighting its correlation with nurses' self-directed learning and the quality of care they provide. In conclusion, the positive correlation uncovered in this study suggests that strategic management reforms should focus on promoting a learning-oriented culture that can significantly improve nurses' self-directed learning capabilities and the quality of care provided.

The experience and results from this study, along with a thorough examination of the limitations inherent in various study designs, also could guide further, more refined research efforts. These further studies may examine whether there is a causal relationship between the level of organizational learning and nurse-level variables (such as self-directed learning and quality of care) in urban CHCs in China. In addition, they may also test whether the organizational learning level of primary care institutions in rural areas of China and its relationship with nurse-level variables exist. Both can help establish a solid foundation for further development of learning organizations.

5.1. Implications for Nursing Management. As China advances towards establishing a high-quality primary care system, the role of primary care nurses becomes increasingly crucial in addressing the challenges posed by the shortage of primary care physicians. It is essential that policies focus not only on structural inputs but also on reforming internal management practices. This study highlights the importance of establishing a culture of organizational learning, which is vital for effective nursing management in primary care settings within China.

First, evaluating organizational learning in 38 CHCs provides managers with a clear understanding of the current level of learning within the organization. This understanding enables them to develop targeted strategies for enhancement based on specific needs. To promote learning effectively, it is advisable to offer nurses' tailored learning plans and career development opportunities, such as regular training and team building activities.

Moreover, the presence of sustainable feedback learning loops relies on shared organizational visions, and the creation of these shared visions requires active participation [59]. To effectively promote organizational learning, nursing managers must recognize and empower nurses to drive these initiatives being critical, as their active engagement is necessary for success; they should concentrate on fostering shared visions that align with evolving healthcare needs; at the same time, managers should ensure that each nurse can get timely and constructive learning feedback and provide necessary support.

Third, scientific and medical advancements present a significant opportunity for healthcare institutions to embrace a learning organization culture [55]. According to a McKinsey report, artificial intelligence can significantly enhance the speed and accuracy of diagnostics, allowing practitioners to access more knowledge more rapidly and easily. This technology is poised to transform medical education by shifting the focus from rote memorization to innovation, entrepreneurship, continuous learning, and

interdisciplinary work. To achieve this, all frontline workers need to integrate AI into their workflows [60]. Managers can leverage this approach to improve knowledge acquisition among nurses, thereby enhancing their learning abilities, anticipating advancements in medical knowledge that can improve nursing practices, and elevating the quality of patient care provided by nurses.

Data Availability

Data are available upon request due to privacy/ethical restrictions. The data will be shared on reasonable request to the corresponding author.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' Contributions

Ruixue Zhao, Wenhua Wang, and Rebecca Mitchell contributed to the study design and conception. Ruixue Zhao contributed to data analysis and interpretation, as well as the initial draft of the manuscript. Wenhua Wang, Rebecca Mitchell, Jinnan Zhang, and Mengyao Li provided language assistance and revised the article. Stephen Nicholas, Elizabeth Maitland, and Huiyun Yang offered suggestions and proofread the paper. All authors have read and approved the final manuscript.

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Review Article

Organizational Support for Nurses' Career Planning and Development: A Scoping Review

Hanna Kallio ¹, Hanna Liljeroos,² Marita Koivunen ^{1,3}, Anne Kuusisto ^{1,3},
Marja Hult ⁴, and Mari Kangasniemi ^{1,2}

¹University of Turku, Faculty of Medicine, Department of Nursing Science, Kiinamyllynkatu 10, Turku 20014, Finland

²The Wellbeing Services County of Satakunta, Sairaalanatie 3, Pori 28500, Finland

³The Wellbeing Services County of Satakunta, Research and Development Unit, Sairaalanatie 3, Pori 28500, Finland

⁴South-Eastern Finland University of Applied Sciences, Patteristonkatu 3, Mikkeli 50100, Finland

Correspondence should be addressed to Hanna Kallio; hanna.m.kallio@utu.fi

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Aim. To systematically map and identify key knowledge on organizational support for nurses' career planning and development. *Design.* Scoping review. *Methods.* Systematic electronic searches were carried out with the CINAHL, PubMed, Scopus, and Web of Science databases in May 2022. The searches were limited to scientific, peer-review papers that were published in English from January 2012 to May 2022. Data were extracted and synthesized and are presented in tables and text. The review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. *Results.* We identified 1,400 papers and 28 met the inclusion criteria. Organizations recognized nurses' career planning and development in relation to the individual's professional development and the organization's need to promote high-quality services and workforce engagement. The organizational support included strategic work to ensure there were adequate resources and purposeful vacancies and a structured framework based on objective qualification criteria and equal assessment. Organizations focused on sharing knowledge, structured career planning, and interpersonal support. Support within the nursing profession and multilayered interprofessional collaboration were also important. *Conclusion.* Nurses' career planning and development was linked to their personal development and the organization's aims and required support from both fellow nurses and other professionals. *Implications for the Nursing Management.* Identifying the organizational structures and methods that are needed to support nurses' career planning and development can help nursing management to evaluate and develop strategies that improve the attractiveness of a nursing career and nurses' engagement.

1. Introduction

The growing global shortage of healthcare workers highlights both the need to promote nursing as an attractive career [1, 2] and the importance of engaging the nursing workforce [3]. Previous research has addressed nurses' desire for professional and career development [1, 4, 5]. Nursing careers are typically directed towards leadership, academic [6], or educational work [7] but previous knowledge on career development opportunities in bedside nursing is limited [1, 4]. Poor career prospects [4, 6] and

a lack of recognition [8] have decreased meaningfulness and satisfaction at nurses' work resulting in staff turnover [9, 10].

Hence, career planning and development (CP&D) is a topical issue for nursing workforce management [4, 6]. CP&D refers to a nurse's expectations and prospects for work goals, advancement, and progress in their career development [10, 11] based on continuing learning [10] and recognized expertise [4, 12]. Nurses' CP&D has been studied in relation to individual factors, namely, the inner motivation to select nursing as a career and developing their own excellence and progress in that career [1, 13]. The need for

nurse's autonomy [8, 14] and personal resources [15], own responsibility, and motivation for CP&D has been highlighted [16]. However, research has also identified nurses' unfamiliarity with CP&D [17] as well as their neglect for building relationships to advance their careers [10].

An important factor for nurses' CP&D is organizational support and organizations' role has been emphasized in promoting CP&D to ensure nurses' efficiency, engagement [18], and care quality [5, 10]. Based on previous research, health and social care organizations who are committed to their staff tend to support nurses' CP&D with systematic, long-term strategic management and structures [19, 20]. The role of organizations and managerial engagement [21] has also been emphasized in relation to ensuring informed career guidance for nurses as well as the return of CP&D to the benefit of the organizations [17].

Previous reviews on career development in nursing have covered nurses' career intentions [8, 14], professional development [22, 23], career success [15], career path options [12], and the implementation of clinical ladder programs [21]. Instead, knowledge on organizational support for nurses' CP&D has been fragmented and needs to be brought together to provide the basis for the evidence-based development of nurses' working lives. It has been unclear what are the means for promoting nurses' CP&D, and identifying them is needed for the coherent development and evaluation of CP&D in organizations. It is essential that versatile means are available to support employees, which contributes to the equal treatment of them and, above all, their individual career plans. The study is also needed to identify the knowledge gaps that need to be addressed by further research. Thus, the aim of this scoping review was to systematically map and identify key knowledge on organizational support for nurses' CP&D. The research questions were as follows:

- (1) How has nurses' CP&D been defined by organizations?
- (2) How do organizations support nurses' CP&D in general?
- (3) What methods do organizations use to support nurses' CP&D?

2. Methods

2.1. Study Design. We conducted a scoping review on studies that focused on organizational support for nurses' CP&D. The scoping approach was chosen, as it was suitable for mapping and summarising previous fragmented research evidence on the topic and it was able to identify key concepts and research gaps [24]. The review was carried out in the following five stages [24]: (i) formulate the research questions, (ii) search for the relevant studies, (iii) select the studies to include in the review, (iv) chart the selected studies, and (v) report the results. The review was reported following the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR Checklist ([25], Supplementary file 1).

2.2. Search Methods and Selection and Evaluation of Studies. We identified the research questions based on preliminary literature searches and the PICO-structure where the population (P) was nurses, the intervention (I) was organizational means for CP&D, and the outcome (O) was career CP&D. Comparison or control (C) element was not suitable for his study. We carried out the electronic searches using the CINAHL, PubMed, Scopus, and Web of Science databases, which were the most relevant for the study topic. Following preliminary searches, we worked with an informatician to develop explorative search phrases that consisted of free words, fixed terms, and their combinations and synonyms for the two key fields of interests, nursing and career (Supplementary file 2). We limited the searches to scientific, peer-reviewed papers published in English from January 2012 to May 2022. The papers were included if they focused on nurses and organizations who supported their CP&D. The papers were independently selected by two researchers (HK and HL) who reviewed the titles and abstracts and the full texts. The eligible studies were included in the review.

The quality of studies was assessed to increase the transparency of the data [25]. Quality of empirical qualitative [26] and quantitative [27] and theoretical [28] studies was assessed according to the Joanna Briggs Institute's checklists and multimethod studies according to the criteria presented by Harrison et al. [29]. Evaluation of qualitative studies focused on ten criteria, quantitative studies on eight, and theoretical studies on six criteria. Each criterion received one or zero points. There were 13 evaluation criteria for multimethod studies each of which received 0–3 points (Supplementary file 3).

2.3. Data Analysis. We analysed the data by following the principles of inductive content analysis [30]. First, we tabulated the papers according to the year, location, aim, methods, scope of the nursing career, and main results (Tables 1 and 2). Then, we extracted the sentences and paragraphs that described nurses' CP&D and how patient care organizations supported it. The extracted material was then organized into groups based on the similarities and differences and named inductively based on their content. To abstract the data, we then brought the groupings together to form eight subcategories and three main categories (Table 3). Two researchers (HK and HL) carried out the analysis until the extraction phase. Then, it was finalized in collaboration with the entire research team. The analysis was conducted using NVivo v.12 software.

3. Results

3.1. Study Characteristics. The searches yielded 1,400 results; 58 full texts were read and 28 met the eligibility criteria and were included in the review as data (Figure 1). Of the selected papers, 14 were empirical studies; one used quantitative methods, ten used qualitative methods, and three used multiple methods. The other 14 were theoretical papers; seven were nonsystematic reviews, six were project reports, and one was a discussion paper. All the papers were

TABLE 1: Description of the studies.

	<i>n</i>
<i>Year</i>	
2012	1
2013	1
2014	2
2015	2
2016	2
2017	3
2018	4
2019	7
2020	1
2021	4
2022	1
Total	28
<i>Country</i>	
UK	9
USA	7
Australia	3
Canada	2
Indonesia	2
Iran	2
Finland	1
Singapore	1
Sweden	1
Total	28
<i>Method</i>	
Theoretical	14
Qualitative methods	10
Multiple methods/Delphi	3
Quantitative methods	1
Total	28
<i>Scope of career in a paper</i>	
Clinical nursing	16
Clinical academic nursing	8
Nursing leadership	4
Total	28

published between 2012 and 2022. Eleven of the studies were conducted in Europe, nine in North America, five in Asia, and three in Australia (Tables 1 and 2).

The overall quality of papers was moderate (Supplementary file 3). In 10 qualitative studies, the scoring by paper varied between 3/10 and 9/10 (6.9 points out of 10 on average). Scrutinised by the evaluation criteria, the highest points in them were achieved by the congruity between the research methodology and the interpretation of results and data-based conclusions (10 out of 10 studies). Lowest points were achieved by the description of philosophical starting points and influence of researchers (3 out of 10 studies). One quantitative study included in the data received an overall score of 4/8. The three multimethod studies achieved 10, 17, and 19 points out of 39. In them, research aims was most clearly reported (9 out of 9 points) and methodological justifications, sampling, recruitment, and analysis less clearly reported (0 out of 9 points). Theoretical papers achieved scoring from 4 to 6 out of 6 points. In them, expertise basedness was unclear in some papers. For both empirical and theoretical studies, the evaluation criteria were not fully applicable (Supplementary file 3).

3.2. Definitions and Rationale for Nurses' CP&D. The nurses' CP&D in an organization were defined and justified from individual and organizational points of views. These contents were interlinked and created a basis for CP&D (Table 3).

3.2.1. Individual Level: Increase in Personal Competency to Respond for New Work Challenges in the Organization. On an individual level, nurses' career planning was described as an intentional act that focused on their competencies and the kind of work that would support their career in the future [33]. Career development was described as an increase in the individual development of personal qualities [34], competencies [16], strengths and talents [35], role expansion, and professional development [36]. Challenges were increased [36, 37] and so was the authority that nurses needed to execute and prioritize new duties [37, 38] and the abilities they needed to deliver quality patient care [32]. The work needed to be challenging enough to drive career development [39, 40] and enable the individual to show creativity [34]. New or expanded roles needed to be documented in job descriptions [36] and job titles [37]. Advancing to higher positions resulted in larger salaries [36, 37]. Career development aimed to strengthen nurses' professional identity [41] and pride [38]. Nurses were respected by patients and the working community [37] and their power and authority in organizations [34], and their participation in organizational decision-making, had increased [41].

3.2.2. Organizational Interest: Resources for Improving the Quality of Care and Services. Nurses' CP&D reflected an organization's commitment to staff development [31] and was connected to successful recruitment [41] and retention [40]. Organizations that supported nurses' careers showed that they recognized and valued their staff's skills and experiences [39] and their readiness to develop nursing career paths, including their attitudes, efforts, efficacy, and commitment [16]. From an organizational point of view, CP&D improved their performance, motivation, and productivity [36] and this improved the quality and safety of care and services [16, 35, 42]. Thus, CP&D was seen as a medium for quality accreditation [38] and improvement [41] to support evidence-based practice [43] and research strategies [44]. Organizational support for nurses' CP&D increased work satisfaction [16, 32, 37], motivation, and retention [39, 41, 45]. Nurses with organizational career development opportunities were engaged in organizations [39] and being rewarded supported their career progress [46]. In addition, clear structures for nurses' career paths supported interprofessional collaboration in organizations [38].

3.3. Organizational Structures to Support Nurses' CP&D. The key organizational structures to support nurses' CP&D started from a strategic level in an organization and required a structured framework and continuous evaluation strategies to monitor success (Table 3).

TABLE 2: Selected studies.

Author(s), year, country	Aim	Methods (scope of career)	Main results or central content
Afriani et al. [16], 2021, Indonesia	To identify the relationship between institutional and nurses' readiness for change in implementing nursing career paths in health centres	Quantitative survey of 93 nurses in public health centres and statistical analyses (clinical nursing)	There was a strong positive relationship between institutional and nurses' readiness. Institutional readiness for change, such as superiors' attitudes and commitment, and nurses' readiness, were needed to implement nursing career paths in public health centres. The nurses considered both had reached a good level
Bramley et al. [35], 2018, UK	To describe the implementation and evaluation results of the bespoke chief nurse fellow programme for frontline junior clinical staff. This was designed to develop skills in innovation, leadership, improvement science, and change management	Theoretical paper: project report (nursing leadership)	The pilot programme had a positive impact on the nurses' professional development and enabled them to become familiar with an alternative career route
Chen and Haller [55], 2015, Canada	To examine the relationship between nurses' career burnout and career wellbeing and how career counsellors can improve their career wellbeing	Theoretical paper (clinical nursing)	Career counsellors can improve nurses' career wellbeing by enhancing effective coping skills and helping goal progress. Combining narrative and social learning career counselling approaches were suggested
Choo et al. [37], 2019, Singapore	To explore the role-transition experiences of assistant nurse clinicians after their first year of appointment	Qualitative primary care study. Interviews with 22 registered nurses and content analysis (clinical nursing)	Previous clinical experience eased the transition. Peer support, mentorship, and training in managerial skills were needed
Cooper et al. [43], 2019, UK	To outline how nursing, midwifery, and allied health professions had been supported to develop clinical academic roles and their contribution to research and innovation in care	Theoretical paper (clinical academic nursing)	Clinical academics needed organizational support to combine clinical and research activity. The hospital's strategic commitment to promoting research and evidence-based practice was important. Clinical staff needed predoctoral opportunities to become familiar with academic work. Work time and mentoring was needed to apply for funding in the postdoctoral phase
Duffield et al. [39], 2014, Australia	To evaluate a career development policy in South Australia, which increased the number of senior staff nurse positions and provided senior registered nurses with time away from clinical duties to undertake agreed projects	Qualitative hospital-based study with 54 senior staff nurses who participated in career structure arrangements and interviews. Analysis method not specified (clinical nursing)	The organization's policy increased the number of senior staff nurse positions and enabled senior RNs to get involved in strategic portfolio projects that aimed to improve organizational effectiveness and care quality. Nurses felt this new policy helped their career and skills and enriched their working lives

TABLE 2: Continued.

Author(s), year, country	Aim	Methods (scope of career)	Main results or central content
Esplen et al. [42], 2018, Canada	To describe a model of education developed based on the novice to expert specialty training framework and its success in offering structured oncology continuing education training to nurses, from undergraduate levels to continued career development in clinical settings	Theoretical paper: project report (clinical nursing)	The paper underlines the importance of nurses' continuing education and certification to ensure high clinical competency. An education institute developed oncology education, including mentorship for lifelong learning and a novice to expert framework with a credit system and a national certification exam. The learning institute partnered with nurse associations. The model notably increased oncology nurses' certifications
Faithfull-Byrne et al. [31], 2017, Australia	To describe a quality improvement project to promote nursing assistants to enrolled nurses	Theoretical paper: project report (clinical nursing)	A hospital and educational institution created a flexible career path for nursing assistants to become enrolled nurses. The two-year study programme included theory and clinical practice. The hospital's nurse educator coordinated the studies and nurse managers helped students to balance their work. Grants covered financial losses due to time away from work. The programme was an effective workforce development strategy for the hospital
Freeman and Gray [33], 2013, UK	To discuss the benefits of a career and development framework for infection prevention and control nurses, developed by a health service organization	Theoretical paper (clinical nursing)	The framework defined responsibilities and professional requirements from practitioner to consultant level, focusing on leadership, learning, evidence, research and development, and clinical practice. It helped individuals to progress their careers, employers, and managers to plan their workforce and mentors to providing support
Jangland et al. [54], 2021, Sweden	To evaluate the implementation of a multifaceted mentoring programme in a large university hospital and describe its value from the perspectives of newly graduated nurses, experienced nurses, and the hospital	Qualitative hospital-based study on 35 nurses, supervisors, and nurse managers, with interviews and thematic analysis (clinical nursing)	Mentors were senior nurses. The mentoring programme comprised research knowledge to guide nursing work, practical and situational guidance for clinical nursing, and group discussions. New nurses found the programme meaningful for their work wellbeing and senior support important in their clinical work. Acting as mentors offered senior nurses a new career opportunity
Jokiniemi et al. [47], 2020, Finland	To formulate, validate, and disseminate policies modelling nurses' career pathway from registered nurse (RN) to advanced practice nurse (APN)	Multiple methods: review, interviews, survey and expert group discussions (clinical academic nursing)	Three competence levels were modelled: RN, specialized nurse, and APN. Central elements in a national RN to APN policy were establishing and enabling new roles, developing education, enhancing appreciation, networking and collaboration, knowledge translation, and governing the roles

TABLE 2: Continued.

Author(s), year, country	Aim	Methods (scope of career)	Main results or central content
Lanada and Forde-Johnston [45], 2021, UK	To reduce variations and standardize job titles, job descriptions, and job plans for clinical nurse educators (CNEs) and identify the academic requirements and professional experience required of each band	Qualitative study with 12 CNEs and 11 senior nurses. Focus group interviews and comparative content analysis (clinical academic nursing)	Job titles, descriptions, and plans were reviewed and CNE roles standardized to reduce variations and inconsistencies. These aligned overall job summaries, teaching activities, and management responsibilities. CNEs were offered career advice and support in line with these career progression descriptions. Staff perceived the new roles as meaningful
Lees-Deutsch et al. [48], 2016, UK	To enable nurses, practitioners, and managers to distinguish between enhancing, expanding, or advancing practice. To clarify points of progression and integrate "advancement" into an acute medical setting	Theoretical paper (clinical nursing)	The paper presents a conceptual framework for nursing career advancement in acute medicine. The framework included five ascending levels of practice and distinguished enhanced, expanded, and advanced ones
Martens et al. [56], 2018, USA	To identify common experiences or barriers during the first year as certified registered nurse anesthetists (CRNAs) moved into management To identify the knowledge, skills, abilities, and resources needed to ensure a smooth and successful career transition	Qualitative study with 20 members of the American Association of Nurse Anesthesiology Interviews and qualitative analysis. (Nursing leadership)	CRNAs had often "fallen" into managerial roles without adequate managerial competencies. Transition support, mentorship, and education were important in the role. People skills were crucial in managerial work
McGhie-Anderson [46], 2017, USA	To gain an understanding of the social processes associated with the decision of diploma and associate degree nurses to advance academically	Qualitative hospital-based study with 15 diploma and associate degree nurses and 7 other nurses. Interviews and qualitative data analysis (clinical academic nursing)	Rewarding, motivating, and supporting were important factors for nurses' decisions to advance academically. Rewards and positive work environment motivated nurses to progress
Pacho et al. [57], 2023, USA	To present the implementation of a program in a medical centre to support ambulatory care nurses make the transition from direct care to clinical nurse coordinator roles	Theoretical paper: project report (nursing leadership)	The four-week programme combined a web-based toolkit, mentoring network, and shadow shifts. Programme evaluation reflected the nurses' satisfaction with the program and their desired professional advancement
Rahimi et al. [34], 2019, Iran	To investigate the factors affecting career development of nurses in Iran	Delphi study. Hospital-based with 48 nurses and nursing faculty members. Interviews and content analysis, questionnaires, and statistical analyses (clinical nursing)	Central factors affecting nurses' career development were specialization, professional development, and increasing their organizational power and influence
Reville and Foxwell [51], 2017, USA	To present a new competency evaluation tool, the Advanced Practice Palliative Nurse Competency Milestones, to provide a framework for its application and to describe the authors' experience with its use	Theoretical paper (clinical academic nursing)	The tool suggests five competence levels from novice to expert in nine areas of palliative competence

TABLE 2: Continued.

Author(s), year, country	Aim	Methods (scope of career)	Main results or central content
Roddam et al. [49], 2019, UK	To explore the perspectives of aspiring or active clinical academics and health care managers in the nursing, midwifery and allied health professions (NMAHPs) about the benefits, barriers, and enablers of engagement in these career pathways	Qualitative healthcare study focusing on NMAHPs. Workshop data and thematic analysis (clinical academic nursing)	An organizational structure and resources were needed to enable clinical academic career progress, including funding and permanent academic posts. Individuals' research capacity needed to be promoted and networks and mentoring played a central role
Ryley and Middleton [52], 2016, UK	To discuss the implementation of the Welsh Government's advanced practice framework into a Welsh University health board	Theoretical paper (clinical academic nursing)	The paper presents the five stages of the development of the advanced nurse practitioner role
Sandehang et al. [38], 2019, Indonesia	To investigate career mapping for nurses at a new hospital in Jakarta	Qualitative case study in hospital. Discussing CP&D with 8 registered nurses and 6 nurse managers. Content analysis (clinical nursing)	Career mapping aimed to match nurses with adequate skills with optimal work based on prerequisites set by the employer. Mapping focused on the educational level, work experience, and competency assessment. Some challenges were recognized, such as time limitations
Sattler et al. [40], 2021, USA	To describe the innovative nurse retention role implemented in the medical health system in the USA	Theoretical paper: project report (clinical nursing)	A medical health system developed a nurse retention role, including meetings with nurses, building collaborative relationships, revising clinical ladders, cultivating peer mentoring, creating a system-wide recruitment structure, and promoting recognition of effort. Participation in nursing career development increased, nurse turnover dropped significantly and financial savings were achieved
Sheikhi et al. [36], 2015, Iran	To explore nurse leaders' experiences of implementing the nurses' career advancement pathway program in Iran	Qualitative study in hospital with 16 nurse managers. Interviews and content analysis (clinical nursing)	First, shortcomings in performance evaluation were recognized as evaluations were not continuous, there was no agreement between the evaluation criteria and the nurses' job descriptions and evaluation was subjective. Second, they needed to pay attention to the point accumulation so that it did not exceed educational needs. Third, there was an advancement-latitude mismatch. Career advancement may lead to pay rises and higher positions but not role expansion and considerable changes in job descriptions
Smith et al., 2018 [44], Australia	To consider clinician researcher career frameworks. To propose a new pathway, integrating university and health service components to support research career progression within nursing and midwifery practice	Theoretical paper: discussion (clinical academic nursing)	A national researcher career pathway for nurses and midwives was proposed, which comprised six levels from research assistant to chair/clinical professor. Each level specified a title, level of qualification, Australian qualifications framework level, role expectations, and examples of role-specific skills

TABLE 2: Continued.

Author(s), year, country	Aim	Methods (scope of career)	Main results or central content
Thompson et al. [50], 2012, USA	To introduce a model emphasizing the importance of mentoring and/or coaching for the aspiring executive nurse leader	Theoretical paper (nursing leadership)	Nurses' career trajectories towards leadership roles can be supported by mentoring and coaching. Mentoring is support, role modelling, discussions, and reflections between a nurse and an experienced executive. Coaching is more orientated to targets and clients and about nurses growing into their new roles. When nurses aspire to executive positions mentoring and coaching can proceed in three phases: basic fundamental knowledge, experiential learning, and advanced system thinking
Tucker et al. [53], 2019, USA	To describe how knowledge translation tools were used to guide the implementation of a professional development and career planning program, developed and piloted in an urban Chicago hospital. The aim was to reduce the turnover of newly hired nurses and looking at how to make this a sustainable change	Theoretical paper: project report and commentary (clinical nursing)	Nurses planned their career with a program coordinator and received information on career developmental possibilities. The Alberta Context Tool collected information on the nurses' work environment, namely, the units' strengths and readiness for change. Programme implementation included assessing, monitoring, and evaluation. Educating and involving nurse managers was central. Nurse turnover decreased. Use of knowledge transition models, context assessment, and expert recommendations for implementing change strategies were important for sustainable change
Wasike et al. [41], 2019, UK	To examine the learning outcomes from a pilot career program developed to advance home care nurses' professional competencies and career planning	Multiple method study with 15 home care nurses. Questionnaires and statistical analyses, interviews, and thematic analysis (clinical nursing)	The six-month program comprised one-day workshops and particularly focused on leadership and quality improvement skills, potential career paths in home care, and conversation confidence. Nurses found the program beneficial for their practice, professional self-image, and planning career
Woolhough and Fielden [32], 2014, UK	To investigate the effects of a career development and mentoring programme on female mental health nurses' career and personal development. The study used a matched comparison group	Qualitative study in mental health nursing with 54 female mental health nurses: 27 who did and 27 who did not receive intervention. Interviews and thematic content analysis (clinical nursing)	The nurses who participated in the program experienced personal development outcomes. Participants progressed more in their career during the 18-month period than the control group

TABLE 3: Nurses' career planning and development (CP&D), organizational structures, and support methods.

Main categories	Subcategories	Groupings
Definitions and rationale for nurses' CP&D	<ul style="list-style-type: none"> (i) Individual level: target-oriented increase of personal competency to respond to new work challenges (ii) Organizational level: resource for improving care and service quality and workforce's commitment 	<ul style="list-style-type: none"> (i) Intentionally directing competencies and content of work (ii) Expanding role and professional development (iii) Strengthening professional identity and pride <ul style="list-style-type: none"> (i) Signalling respect for staff (ii) Improving performance (iii) Promoting nurses' commitment in organization
Organizational structures to support nurses' CP&D	<ul style="list-style-type: none"> (i) Nurses' career development and support at the strategic level within an organization (ii) Structured framework for nurses' CP&D (iii) Evaluation and follow-up of the success of CP&D 	<ul style="list-style-type: none"> (i) Expressing values and aims in organization (ii) Strategic policy for anticipating workforce and competence needs (iii) Strategic educational partnerships (iv) Resourcing and strategic investment (i) Career stage mapping and identifying nurses' competencies in organization (ii) Standardizing qualifications for all career stages (iii) Various career opportunities and pathways (i) Nurses' satisfaction to career planning and development structure (ii) Achieving goals in care and service
Means to support nurses' CP&D in organization	<ul style="list-style-type: none"> (i) Competence promotion (ii) Personal career planning (iii) Interpersonal support 	<ul style="list-style-type: none"> (i) Career awareness promotion (ii) Substance training (i) Portfolios and career plans (ii) Follow-up/evaluation (i) Career-oriented work environment (ii) Leadership support (iii) Mentoring (iv) Networks and peer support

*CP&D = career planning and development.

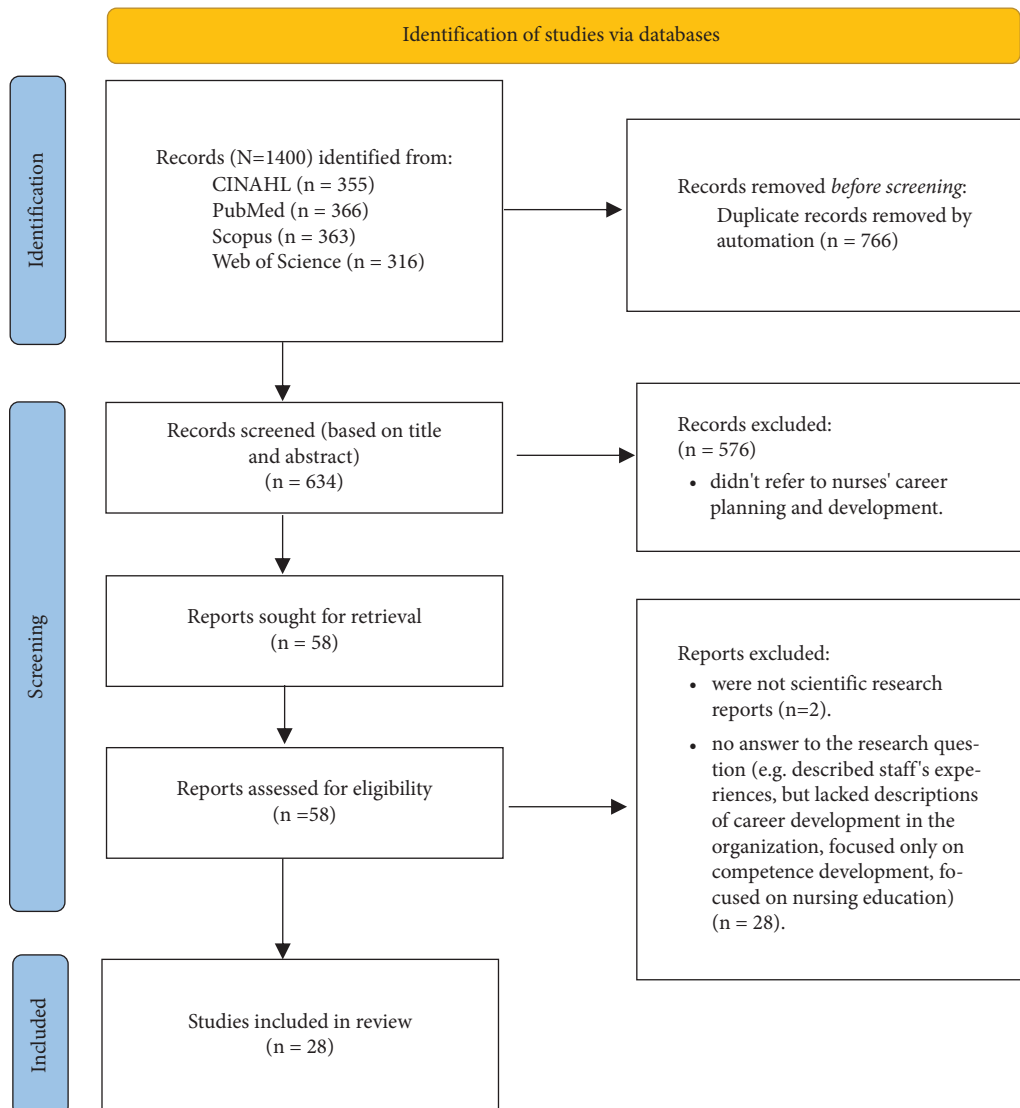


FIGURE 1: PRISMA flowchart.

3.3.1. Strategic Level Support for Nurses' CP&D in an Organization. Nurses' CP&D reflected an organization's values, aims and culture, and CP&D needed to be included in the organization's strategy. Future oriented, progressive organizations had a core interest in being committed to nursing staff [37, 43], creating different career opportunities [16] and promoting their career development [43, 46]. In addition, organizations were responsible for promoting the career development of nursing staff [38] and implementing national recommendations and standards to promote their career paths [16, 44, 47].

Recognizing nurses' CP&D was also seen as part of an anticipated strategic policy for workforce and competence needs in an organization, which aimed to match organizational tasks with the competencies needed by the workforce [33]. Matching required considering current staff competences and age structures [48] and reconsidering vacancies [45]. In addition, senior [39] and progressive positions for educated academic staff were needed to engage

them in organizations [49]. Matching also required evaluating changes in job descriptions and their effect on workload [38]. In addition, infrastructure for building organizational research capacity was required to support nurses' academic career progression in organizations, including research networks between universities and hospitals [49].

Organizational support for nurses' CP&D required strategic educational partnerships. This referred to planning and executing educational programmes in collaboration with healthcare and learning institutions [31, 38]. Programmes focused on staff re-education [31] and extended their competencies to respond to changing needs [33] and to the development and flexibility of nursing positions and new posts [43]. In addition, strategic educational partnerships included learning institutions that provided lifelong learning possibilities for staff [42].

Supporting nurses' CP&D through organizational strategies also included direct and indirect resourcing and

strategic investment. Direct resourcing included budgeting for cumulative salaries according to career progress [46], together with bonuses or other monetary compensation [38, 46]. In addition, supportive, rewarding systems referred to nonmonetary remuneration and included psychological payment for participating in organizational decision-making, progressing in their career [46] and social recognition activities [40]. Direct resourcing also included providing nurses with sufficient equipment to complete their new duties and professional responsibilities [39]. Indirect resourcing for CP&D referred to planning human resources to allow career development and providing sufficient permanent staff and substitutes to enable nurses to participate in education [31, 38, 39, 49]. In addition, vacancies and job description required constant reconsideration and updates so that they corresponded to nurses' career development, increased competencies, special nursing care duties [39], and research and developmental work [49]. In addition, mixed model vacancies between academia and services or public and private sectors supported CP&D [44]. Resourcing also focused on strategic investment for CP&D, as investment in education and competencies improved organizational effectiveness [39] and employees' engagement [49].

3.3.2. Structured Framework for Nurses' CP&D. The structured frameworks to support nurses' CP&D in organizations included nurse manager act as they played a crucial role in career stage mapping and identifying nurses' competencies [38, 50]. These were needed at both unit and individual staff levels [40, 48, 51] to determine nurses' competency levels based on prerequisites set by the organization [38]. At unit levels, updated overviews of available competencies were needed to evaluate how to respond to care needs and anticipate the requirements for future staffing and competencies. At the individual staff level, career stage mapping enabled nurse managers to address suitable responsibilities for staff members with adequate competencies [38, 52]. Career stage mapping consisted of considering the individual nurses' education level, work experience, and duration of work and their competency evaluation [38]. However, identifying nurses' competencies was challenging [49], especially with regards to tacit knowledge [48]. Thus, evaluation required optimal frequency and visibility and tested evaluation criteria tailored to the job description [36].

Standardized qualifications for all career stages were suggested to achieve systematic progress and fair evaluation [36, 44, 51]. Logical career trajectories [41] required clear job descriptions [37, 45] and identifying key knowledge, skills, behaviours, roles, and responsibilities [33] for each career phase. This included definitions for each competency level, from novice to expert [51]. Based on that, all individuals at the same career stage should have developed their skills, capacity, and knowledge to the same standards and have equal responsibilities [33, 52]. The benefits of structured career trajectories were twofold. First, they helped nurses to identify their career and progress opportunities and recognize their knowledge level and further training needs [33]. Second, structured career trajectories served as a tool for

nursing managers to evaluate the individual competencies of nurses and nursing staff [16, 51] and to design mentoring and educational programmes for organizations [33]. The standardization and implementation of a structured framework for nurses' career development needed to be evidence based and respond to the purpose of the organization [45]. They should be regularly updated [38] based on committee work in the organization [33] and involve strategic administrators [16] and human resource teams [45] and coordinators [16]. Implementation required nurse managers [33] and nursing staff to be educated about frameworks [53].

Various career opportunities and pathways in organization supported nurses' CP&D [38]. In clinical nursing, these opportunities included daily patient care [39], specialization in some field of nursing [54], and specific tasks in practice [33, 40, 42]. Career opportunities also included more academic options, such as advanced practice [33, 52], project work [39], clinical research [44, 49], and working as a nurse manager [37, 50] or educator [33]. In addition, peer mentoring was considered to be a career opportunity [54].

3.3.3. Evaluating and following up Nurses' CP&D. At an organizational level, constant evaluations and follow ups on implementing nurses' CP&D focused nurses' satisfaction on the existing structures for CP&D [32]. The structures that were evaluated focused on providing education and mentorship and collaboration with educational institutions [38]. In addition, evaluation was focused on outcomes of executed care and service. This referred to the goal of achieving high-quality care and services focused on how nurses could respond to care needs [38] and promote the image of the hospital [38].

3.4. Means to Support Nurses' CP&D. The key means to support nurses' CP&D were promoting their competencies, facilitating, and promoting their personal career planning and interpersonal support (Table 3).

3.4.1. Competence Promotion. Career awareness promotion and substance training supported nurses' CP&D. Nurses' career awareness was increased by publishing and presenting career options [49, 53] and success stories [49, 50] in organizations [39]. Career awareness was also promoted by providing nurses opportunities to get acquainted with certain careers, such as developmental work, education, or leadership in practice [35]. Such awareness eased the transfer into academic positions [37]. Substance training referred to nurses' opportunities for lifelong learning [34]. They included formal [37] and tailored educational programmes for staff on their career trajectory [35, 41, 49] and re-education by taking new degrees with the support of an organization [31].

3.4.2. Personal Career Planning. Portfolios [52] and personal career plans were used to support nurses' CP&D. Portfolios were documents, where nurses demonstrated their professional and academic accreditation, competence,

and capacity, continuing professional development, and readiness for career progress [52]. Personal career plans or individualized action plans [40, 50] referred to voluntary or compulsory [53] oral discussions [33] or written plans [53]. Career stage frameworks were used as templates for planning [33]. Oral plans involved personal discussions between staff members and nurse managers [45, 48] or with a career coordinator [53] or nurse retentionist. The aim was to identify each nurse's strengths, talents and goals [40], develop, and clarify their individual career prospects [33, 48] and evaluate yearly progress [48] and educational needs [33]. Personal career plans or portfolios were used to evaluate career progress [33, 48, 52].

3.4.3. Interpersonal Support. Interpersonal support for nurses' CP&D referred to support from leaders, mentors, networks, peers, and their work community. Career-oriented work environments [46] referred to organizational values and the crucial role played by nurse managers [31, 37]. These work environments were open and the professional ambitions of the individual nurses were respected [53]. Leadership support by nurse managers played a crucial role in guiding and supporting nurses [38, 40, 45] and career progress [16, 46], in line with organizational developmental policies [38]. The nurse manager's role was to provide opportunities for career progression by engaging nursing staff [39] and enabling them to participate in educational activities [43]. One-to-one career advice and support from the divisional recruitment and retention leads [45] and nurse retentionists [40] were pivotal.

Papers focused on different aspects of mentoring or coaching [50] that supported nurses' CP&D [32, 40]. These were mentoring for evolving career planning [35, 55], identifying different types of career trajectories [32, 35], supporting career transfer phases [40, 50, 54, 56, 57], following up career success [40, 43], and promoting lifelong learning [42]. Nurses' CP&D was mentored by nurse managers [32] and experienced supervisors [54]. The aim of all types of mentoring was to support goal achievement [32, 50], realistic aim setting, and periodical progress assessments [51]. Mentoring was informative [37, 43, 54, 56, 57], emotional, and psychological [37, 55]. Cognitive support [56] and guidance aimed to strengthen nurses' self-efficacy [38, 54], confidence [32, 41], and self-image [41]. Mentoring included discussions about challenges and ethical conflicts [54] that nurses had faced [37, 50]. Mentoring was carried out during regular meetings [35, 56], with reflective discussions [40] and feedback [56], to discover nurses' strengths and developmental needs [40]. Nursing networks and peer support provided interpersonal support for nurses' CP&D. Peers were crucial for sharing knowledge and providing emotional support [37, 40] within informal networks [49].

4. Discussion

Organizations recognized nurses' CP&D in relation to the individual's professional development and what the organization needed to do to promote quality services and workforce engagement. There were multiple levels of

support for nurses' CP&D. These included the organization's strategic work level, which ensured that resources and purposeful vacancies were available, and the structured framework level, which focused on objective qualification criteria and equal assessments. Different methods were needed to support nurses' CP&D opportunities, including ensuring that they were aware of career planning and providing them interpersonal support. CP&D was linked to an organization's aims. Support was needed within the nursing profession but also through multilayered interprofessional collaboration that was designed and implemented by organizations.

Nurses' CP&D in an organization provided mutual benefits for nurses, employers, and society as the individual and organizational level benefits of nurses' CP&D were strongly interlinked. They increased personal competencies to respond to work challenges and, therefore, the organizational capacity to achieve high-quality focused care and services ([5]). It seemed reasonable for nurses' employers to support their careers, as organizational support for CP&D contributed to the nurses' motivation and their experience of meaningful working life. It also promoted an employer's attractiveness and workforce retention. Despite the importance of nurses' CP&D, there has been a lack of studies, particularly empirical ones.

Nurses have a less clear and narrower career development trajectory than, for example, physicians [48]. Nursing careers often progress from clinical positions to leadership roles or academic tasks, while less attention has been paid to career development in bedside nursing. This is a conspicuous deficiency in nursing and healthcare services, from the perspective of the care quality development and the attractiveness of a clinical career. Patient care is known to be a central reason for choosing nursing as a career [1] and for nurses wanting to develop their careers in this area [39]. Moreover, career development that only focuses on academic and leadership paths is insufficient from a resource point of view, as the need for these roles is minor compared to the need for bedside professionals.

The results of this review emphasize nurses' CP&D in patient care organizations. However, nurses' CP&D is not limited to the boundaries of an organization but extends all the way to the societal need for a highly qualified nursing workforce and equal service provision for clients at a national level. Nurses also need equal treatment wherever they work. That is why national uniform models have been proposed to guide the steps in academic nursing careers [33, 47] and widely promote and standardize equal CP&D possibilities for nurses' in local districts and patient care organizations. These kinds of generic and acknowledged models would also need to cover bedside nursing and play important roles in helping people to choose nursing careers and inform and guide them when they do ([12]). However, generic career models are only part of the story. Regional differences in patient-nurse ratios need to be considered so that campaigns are applicable in districts and organizations. Nurses' trade unions and education play a key role in making CP&D models familiar. Thus, integrating career

development competencies and career planning in nursing and nursing leadership education would promote uniformity of nurses' career competencies and awareness.

Nurses' CP&D requires organizational structures and for individuals to play a proactive role. Nurses' organizations need to carry out strategic work on the career information and resources that are crucial. Individuals experience remarkable time and financial pressures during education ([22]). Employers who provide support to overcome these challenges need to implement multifaceted strategic planning and collaboration. These include building financial cooperation models [43] to, at least partly, cover educational expenses. Our study showed that organizational structures needed to focus on identifying equal opportunities to develop competencies and acquire qualifications, as well as provide resources. Clear career paths models and competency assessment criteria contribute to the objectivity and transparency of administrative decisions. However, it should also be noted that professionals who assess how competent personnel are need up-to-date evaluation skills [38] and appropriate competency assessment tools [51].

Even the best organizational structures do not guarantee career development without the individual's own contribution. Every nurse is responsible for their professional development and competencies [38] and plays a key role in their CP&D. Career pursuits require certain readiness [16], namely, awareness of CP&D possibilities, self-efficacy, motivation [38], and emotional readiness [16]. Not least, nurses need to show an appreciation of, and desire to, progress their career [55]. Organizational and individual readiness are known to be interlinked, as organizational support activities have improved nurses' readiness to progress in their careers [16].

Studies on nurses' CP&D had mainly been conducted using empirical qualitative methods, besides which many were theoretical project-based papers. Combining different studies and methods allowed us to map and summarise previous knowledge and provide an overview [24, 25] of nurses' CP&D in healthcare organization. It is noteworthy that the quality of the selected papers varied, particularly within qualitative studies. The strongest areas in them were the congruity between the methodology used and the interpretation of results, as well as data-based conclusions. The weaker areas of reporting concerned philosophical starting points and the researchers' influence on a study. Thus, quality appraisal was needed to increase the transparency of the data. It revealed methodological accuracy to enable reliable and evidence-based development of nurses' CP&D.

4.1. Study Strengths and Limitations. The limitations of this study were related to the review process [25], more specifically to literature searches and selection. Because career concepts are widely used in the nursing-related literature and to reach a reasonable number of search results, we had to focus the literature searches on titles of the papers. As a consequence, some relevant papers may have been unintentionally excluded. Also, although the literature

selections were carried out based on purposeful criteria and by two researchers, it is possible that some studies dealing with the topic remained unselected. In addition, we only included papers published in English, which may have biased our data.

5. Conclusion

Organizations need to see nurses' CP&D as beneficial, necessary for the development of professional nursing practice and a crucial part of the organizational goals needed to achieve high-quality patient care. In contemporary nursing, nurses' CP&D also increasingly contributes to an organization's attractiveness as an employer and to nursing as a career. Clear and transparent structures and models to support and enable nurses' CP&D are central and needed for equal career progression and meaningful working lives. At the same time, nurses' own ambitions and career awareness play crucial roles in CP&D, emphasizing the importance of integrating the topic of CP&D into clinical and leadership education. Further research is needed about the outcomes that nurses' CP&D deliver for their organizations and patient care.

6. Implications for Nursing Management

The growing shortage of nursing staff forces their leaders to develop new ways to promote the meaningfulness and attractiveness of nursing, where career opportunities are one central focus. Nurse managers play a key role in ensuring nurses' work engagement [58] and this study helps them to understand nurses' CP&D and its meaning for an employee and organizational benefits and what kind of structures and means are needed to support it. Moreover, the study opens up the key role of nurse managers in supporting nurses' CP&D at an individual level and in nurse communities. Eventually, nurses' CP&D supports the achievement of the overall goal in the organization.

Data Availability

The data used to support the findings of this study consist of scientific articles that can be found from electronic databases mentioned in the manuscript.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Supplementary File 1: Prisma-ScR Checklist. Supplementary File 2: the search terms used. Supplementary File 3: quality appraisal of studies. (*Supplementary Materials*)

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Research Article

Perceived Academic Team Leaders' Authentic Leadership and Team Members' Psychological Safety: A Cross-Sectional Online Survey

Majd T. Mrayyan 

Department of Community and Mental Health Nursing, Faculty of Nursing, The Hashemite University, P.O. Box 330127, Zarqa 13133, Jordan

Correspondence should be addressed to Majd T. Mrayyan; mmrayyan@hu.edu.jo

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Background. Current research has mainly concentrated on the psychological facets of authentic leadership and the sense of psychological security it cultivates. **Aim.** This research assessed the perceived academic team leaders' authentic leadership and team members' psychological safety. **Methods.** Using a quantitative cross-sectional study, the study was conducted in 2022 using an online survey. A convenience snowball sample of 105 nursing faculty members was recruited from various Jordanian universities. **Results.** The nursing faculty highly praised their leaders' authentic leadership on a 5-point scale. Yet, they felt a lack of psychological safety for themselves. While the academic nursing team leaders were commended for their readiness to hear others' suggestions before making choices, they should work on resisting group influence. These leaders must convey their feelings openly and truthfully. Concerning their own psychological safety, the nursing faculty felt their distinctive abilities and talents were recognized and utilized when collaborating with team members, which was the most highly rated feature. Conversely, the least-rated aspects were holding mistakes against faculty members and having trouble requesting assistance from others. The nursing faculty's sense of security and comfort significantly impacts their psychological wellbeing. Interestingly, their level of psychological safety is found to have a significant but negative correlation with their marital status, providing a rich and new insight into psychological safety; married females with children are prone to more work burnout, which might lower their psychological safety. On the other hand, a positive and moderate correlation is observed between psychological safety and the size of the team they work with. Surprisingly, the team size is the only factor that predicts the psychological safety of nursing faculty members; this occurs by enhancing the team's creativity and learning behaviors. However, the model itself is not very effective and only accounts for a small portion (6.30%) of the variation in their psychological safety scores, suggesting other unmeasured factors likely play a more significant role in nursing faculty members' psychological safety, such as personality traits, stressors, and job satisfaction. **Conclusion.** The authentic leadership displayed by nursing team leaders does not directly impact the psychological safety of nursing faculty members. The study addresses a critical and contemporary issue within the nursing academic field, providing useful preliminary insights. However, its methodological limitations, including sample selection and the weak explanatory power of its model, suggest that further research is needed. The results highlight the urgent need for immediate interventions to improve the chaotic academic environment they are currently facing, such as enhancing workplace friendship and authentic communication and using entrepreneurial and nonauthoritative leadership styles. Future studies could benefit from diverse samples, longitudinal design, and deeper analysis of contributing factors to psychological safety.

1. Introduction

Academic institutions rely on faculty members to generate and share knowledge, as well as foster a sense of creativity and innovation in their students and society [1].

To fulfill these responsibilities, faculty members must feel psychologically secure. The evolving nature of academic environments necessitates the cultivation of psychological safety among faculty members [1, 2]. However, this cannot be achieved overnight; it requires the presence of

authentic leaders within academic teams who can establish a culture that encourages creativity and innovation [2–5].

In the realm of academic nursing and healthcare, a novel idea called authentic leadership has emerged [5]. Previous studies focused on the psychological aspects of psychological safety and authentic leadership [6–10], neglecting its application in nursing or academic environments. Several recent research studies have focused on the topic of authentic leadership and its relationship to the safety climate in nursing [4, 5, 11, 12]. These studies have also explored the psychological safety of staff members. However, research specifically examining the impact of authentic leadership on psychological safety was lacking. It is important to mention that authentic leadership is usually addressed from the perspectives of positive outcomes; however, it has negative outcomes as well, such as negative workplace behaviors such as bullying, incivility, and staff burnout [13]. In the current research, we assumed that authentic leadership has positive outcomes; yet, the exact reasons behind the positive outcomes of authentic leadership, such as commitment, trust, and engagement of employees in nonacademic organizations, remain uncertain [11, 13–21], which may be linked to the psychological wellbeing of nursing faculty members [22]. Employees experienced a heightened sense of purpose and fulfillment when guided by leaders who demonstrated authentic leadership. Yet, their day-to-day feelings of happiness and overall psychological safety remained largely unchanged [11, 13–21].

The leadership research has been critiqued for lacking contextual understanding; thus, this study would help faculty members and academic administrators understand the effects of authentic leadership on various outcomes, such as the current concept of faculty members' psychological safety [6–10]. As a senior faculty member and previous university administrator in Jordan, similar to other faculty members around the world, I attest that we are struggling with the consequences of the COVID-19 pandemic, such as our worsened financial burdens and the marginalized psychological safety, warranting immediate interventions as we are the role models for our current students who are the future nurses.

Authentic leadership is a leadership style demonstrated by individuals with strong moral principles who accept the consequences of their choices and base their judgments on lasting values rather than temporary gains [4, 5]. In today's ever-changing work environments, especially in academia, authentic leadership is a crucial aspect of individual and organizational behavior [3–5]. At an individual level, it refers to workers who uphold high integrity standards and have the potential to be authentic leaders [3–5]. On an organizational level, it is essential for leaders, particularly those in higher management, to embody authentic leadership [3–5]. Embracing authentic leadership, regardless of the level, promotes employees' psychological safety, which is defined as employees feeling comfortable sharing their thoughts, admitting errors, and being themselves at work without fear of negative consequences [6, 7]. There is a collective understanding that the workplace values

openness, allows room for learning from mistakes, and accepts each individual's true self [6, 7]. In turn, psychological safety prevents harmful behaviors and negative consequences, like medical errors [3–5]. Professionals, including nursing faculty members, continuously strive for their rights and ideal work environments [3–5].

Academic nursing leaders' authentic leadership in Jordan was linked to knowledge sharing within the team and nursing faculty members' creativity [3]. Another study was conducted in Jordan to explore the humble leadership of academic leaders and its effect on the psychological safety of faculty [4]. Moreover, a comparative nursing study in Jordan explored the relationships between the concepts of authentic leadership and the safety climate. However, it did not specifically focus on the psychological safety of staff members [5]. The study found that military hospitals in Jordan had higher levels of authentic leadership among nurses and a generally positive perception of the safety climate. In contrast, government hospitals had a negative safety climate [5]. The current study is the first to link the perceived academic team leaders' authentic leadership and team members' psychological safety in Jordan.

1.1. Research Questions. To my knowledge, the topics investigated in nursing and academic nursing settings have never been the subject of a global investigation before this one. This study assessed nursing faculty members' perceptions of their academic team leaders' authentic leadership and their own psychological safety. The investigation at hand aimed to uncover the following: (1) how do nursing faculty members perceive the authentic leadership qualities of their academic nursing team leaders? (2) What are the perceptions of nursing faculty members regarding their own sense of psychological safety? (3) Does the perceived academic nursing team leaders' authentic leadership predict nursing faculty members' psychological safety? The current study's findings will be utilized to build leadership initiatives that uphold the authentic leadership of academic nursing leaders and establish inclusive work environments to enhance the psychological wellbeing of nursing faculty members.

1.2. Background. In the current dynamic work environment, it is essential to have leaders who create psychologically safe environments [3–7]. This is crucial for fostering creativity and adaptability at the individual, team, and organizational levels, even in academic settings [3]. The acquisition of authentic leadership skills is essential as it fosters a sense of psychological security within the workplace [7–10, 14], including academic settings. Due to the ongoing changes in our academic environments, which call for transformative leadership [4], this study has chosen to investigate authentic leadership instead of focusing on humble, autocratic, and democratic leadership [4]. Authentic leadership is essential for effective work environments and beneficial outcomes, including the psychological safety of the workforce [4–10, 14], especially for our academic faculty members at universities. Authentic leadership improves staff's self-efficacy, job satisfaction, retention, interdisciplinary

teamwork [13, 15], work engagement [11, 16–21], organizational productivity, and citizenship [12, 21, 22]. In the clinical setting, authentic leadership results in high-quality and safe healthcare [4, 21] and safe medication practices [23]. Nonetheless, there is a lack of sufficient research, particularly when it comes to how authentic leadership helps in establishing psychological safety within the nursing profession [5].

Authentic leaders possess qualities that make them trustworthy, optimistic, ethically sound, skilled in navigating change, productive, and capable of assisting their team members [4, 11, 18, 19, 21, 22, 24–26]. In his book, Bill George [27] outlines essential behaviors for an authentic leader as (1) “purpose,” which facilitates the opportunity for passion, (2) “values,” which facilitate behaviors that are aligned to values, (3) “relationships,” which facilitate the importance of building strong relationships with team, (4) “self-discipline,” which facilitates consistency in good and hard situations, and (5) “heart,” which facilitates the benefit for displaying compassion and empathy for team’s well-being. Moreover, authentic leaders have the following traits: (1) “self-awareness” includes accepting one’s talents and weaknesses and showing tolerance for how they may influence others, (2) “balanced processing” involves examining pertinent information from different perspectives before making decisions, (3) “relational transparency” involves expressing emotions or encouraging others to do so to foster trust, and (4) “internalized moral” refers to acting following one’s moral principles [4, 17, 21, 22, 24–26, 28–32].

Because psychological safety is a part of the safety climate [3–5, 11, 12], a positive team climate is a critical driver of psychological safety and would occur when leaders demonstrate supportive behaviors [3]. A psychologically safe work environment, including academic settings, is a product of positive leadership styles, such as transformational leadership and authentic leadership [33, 34] and professional nursing practices [33]. Authentic leaders have the power to foster a sense of psychological safety among their teams by promoting the right attitudes and behaviors. To establish a psychologically safe environment for faculty members in academic nursing, authentic leaders can empower other potential leaders within the team and ensure that the necessary behaviors are reinforced [3].

Creating conducive work atmospheres and establishing clear boundaries are essential for nurturing the mental wellbeing of nursing faculty members [35]. These studies highlight the importance of leadership actions that enhance psychological safety, including recognizing and utilizing the individual strengths and abilities of faculty members, refraining from holding past errors against them, and fostering a collaborative environment where seeking assistance from team members is encouraged [7, 10].

In Jordan, Elrehail et al. [2] conducted a study in universities to measure the effect of transformational and authentic leadership on innovation. Even though it was not about psychological safety or academic nursing settings, Elrehail et al. [2] found that authentic leadership did not have an impact on innovation. In contrast, transformational leadership and innovation were

positively correlated. Contrary to Elrehail et al. [2], Alzghoul et al. [36] found that authentic leadership positively impacts the work environment, creativity, and productivity in Jordanian telecommunication companies. The work environment’s climate mediates the relationship among authentic leadership, creativity, and job performance [36].

To sum up, when academic nursing leaders wholeheartedly embrace authentic leadership, there is a greater chance that nursing faculty members will feel psychologically secure. If faculty members do not feel psychologically safe, the long-term viability of academic settings is in jeopardy. Faculty members are increasingly mindful of the kind of work environments they desire, as well as their role in educating students.

2. Methods

2.1. Design. An online survey was conducted using a quantitative cross-sectional approach. While not incorporating experiments, cross-sectional surveys were employed to examine different environments and choose participants based on the topics of interest and their outcomes. This design is generally straightforward to execute and cost-effective, and it provides initial insights to guide the development of more sophisticated future research [37]. Moreover, unlike other observational approaches, such as longitudinal designs, cross-sectional studies do not track individuals over an extended period [37]. Nevertheless, it is important to note that the cross-sectional design cannot establish causation between variables [37].

2.2. Participants and Settings. In Jordan, there are a total of 12 undergraduate nursing programs, each led by the dean. Assisting the dean in their academic duties are the vice dean as well as the assistant dean for student affairs, the assistant dean for quality management, and the heads of the departments. It is worth noting that informal leaders also play a role in these programs.

The study’s general population comprised Jordanian nursing faculty members, with the target population being those from various universities. The accessible population consisted of nursing faculty members from the selected universities. To gather data, the researcher utilized a non-probability convenience snowball sampling technique was used. Convenience sampling is a nonprobability method through which individuals are selected based on their availability at the time of data collection. Snowball sampling is a nonprobability method in which the ongoing recruitment process depends on who the current participants already know. Both sampling techniques result in self-selection bias, preventing generalizations of the results to the whole population of participants. For instance, the nursing faculty members selected for the study were from the same university as the current researcher, which could introduce a self-selection bias. This means that individuals with specific characteristics may be more inclined to participate in the research compared to others.

Using the personal and schools' Facebook and own WhatsApp, a total of 105 nursing faculty members from two government and two private universities resulted in an 84.67% response rate, though this sample was not representative of the general population of nursing faculty members in Jordan and the target population of nursing faculty members in Jordanian universities. Despite the inability to determine the exact number of leaders or rating groups, this sample size of 105 was selected from a pool of 124 potential participants.

To ensure the statistical validity of the study, the well-known Thorndike's formula, $N = 10(k) + 50$, where k is the number of variables and 50 cases are added to account for the attrition rate, was employed to determine the necessary sample size [37]. The two major variables in this study were the perceived academic nursing team leaders' authentic leadership and the psychological safety of the nursing faculty members. Accordingly, $N = 10(2) + 50$, a minimum of 70 participants was required for this study [37]. However, a total of 105 nursing faculty members were successfully included in the study.

To accurately measure the psychological safety of nursing faculty members, the study required participants to meet certain criteria. It was required that they were actively working as nursing faculty members at a university's nursing school for a minimum of one year, as this would ensure a more precise evaluation of their leaders' authentic leadership, given that psychological safety tends to improve with increased work experience. Moreover, they were expected to show competence in utilizing technological tools to participate in the online survey.

2.3. Research Ethics. The study was authorized by the Institutional Review Board (IRB), where the author is currently working. The study was assigned the reference numbers 2/1/20/2021 (October 18, 2020) and 11/8/2021/2022 (July 25, 2022). Nursing faculty members were informed that their participation in the survey indicated their consent, and they had the option to skip the online survey if they wished. There were no conflicts of interest; however, selection bias is always accompanied by nonprobability sampling.

Ethical behavior and privacy protection are critical in online surveys. With online data collection, there is a need for robust consents that focus on future data sharing [37]. That is, there is a need to disclose the privacy policy. Since it is my own work, I described what personal demographics were collected and how the survey results will be shared. Data were kept anonymous using codes, and their email addresses were not collected in the dataset. Data were also kept confidential by securely storing data and ensuring that only the author had access. Moreover, faculty members were assured that the results were shared exclusively with nursing leaders at the specified universities in order to maintain confidentiality.

2.4. Data Collection. The survey had the following three sections: a 16-item authentic leadership perception assessment scale, a 7-item psychological safety scale, and nine

academic sample characteristics. The survey was hosted on Google Forms from March 10th, 2022, for ten days, and it was designed to allow for one submission.

The researcher announced the study on her Facebook and WhatsApp, allowing participants to decide whether to take part and encouraging them to share the survey link with their friends and contacts. The current researcher began by introducing the study and allowing participants to choose whether they wanted to take part. The survey was then conducted online in English, which is the official language of nursing education. The online survey has detailed invitation letters, contact information, and a declaration of voluntary participation and consent to participate.

Before making it publicly available, I conducted a pilot run of the survey to check for its suitability and applicability of the scales in the Jordanian academic environments. The survey was sent by WhatsApp to ten colleagues, with no necessary changes needed. Once everything was in order, I shared the survey link on the Facebook pages of the Faculty of Nursing and my colleagues. Nursing faculty members who participated in the online survey were considered to have given their consent, and they were encouraged to invite others to take part as well. To ensure maximum participation, a reminder email was sent to nursing faculty members after five days, reminding them to complete the survey only once.

2.5. Instruments. Since the current sample consisted of nursing faculty members teaching in English, the tools were used in their original language. However, a preliminary study was conducted to test if the tools could be used effectively in the Jordanian academic environment, and the results were positive.

The authentic leadership perception assessment tool was the Authentic Leadership Questionnaire (ALQ) [31]. In October 2020, the Mind Garden Institute gave authorization to use the ALQ, which was copyrighted in 2007 by Avolio et al. [26]. The ALQ, a 16-item survey, utilizes a 5-point Likert scale to measure responses. These responses range from strongly disagree (1) to strongly agree (5). The ALQ consists of the following four different categories: self-awareness (items 1, 5, 9, and 13), an internalized moral (items 2, 6, 10, and 14), balanced processing (items 3, 7, 11, and 15), and relational transparency (items 4, 8, 12, and 16). These four dimensions are constantly reported in many recent research studies [4, 5], and meta-analytic and systematic reviews [13, 15] reported authentic leadership and psychological safety concepts. For instance, statements in the ALQ may include examples like leaders acknowledging their weaknesses or their actions align with their values.

To calculate scores, the results of relevant items are averaged, resulting in a total score and subscale scores. In terms of scoring, high authentic leadership is indicated by a score of four or higher on the Likert scale, while a score of three or below represents poor authentic leadership [38].

The ALQ has been utilized in different types of organizations and cultural settings. It has been employed to examine various aspects, including work environments

[8, 14] and team performance [3]. The ALQ has been studied in organizations of different sizes and levels, and its psychometric model has been analyzed in multiple countries [23]. The original tool has predictive validity [31]. The reliability coefficient of the ALQ scale remains consistent with previous studies [4], at 0.95.

Edmondson [6] developed a scale consisting of seven statements to measure psychological safety. Participants were asked to rate their agreement on a scale from 1 to 5, ranging from strongly agree to strongly disagree. Some examples of statements included in the scale are “when I make a mistake on this team, it tends to be held against me” and “team members feel comfortable discussing problems and challenging issues.”

I utilized the scoring method developed by Sexton et al. [38] to assess authentic leadership. A score of four or higher on a 5-point scale indicated high psychological safety, while a score of three or below indicated poor psychological safety. The original tool has been found to have convergent validity [6]. In this study, the instrument's Cronbach's alpha was 0.71, slightly lower than the 0.76 reported in Wang et al.'s previous study [7].

The sample characteristics that were measured included gender (male and female), marital status (single married), age (≤ 34 years and > 34 years), time commitment (full time and part time), level of education (Baccalaureate, Master's degree, or more), presence of official accreditation and quality initiatives in the employer organization (yes and no), tenure (indicating how long an employee has worked for an organization) (≤ 4 years, > 4 years), team size (≤ 15 members and > 15 members), and sector type (governmental and private). The inclusion of variables such as time commitment and team size was made based on the current researcher's perspectives on the concept of psychological safety.

2.6. Analyses of Data. Before commencing the analysis, the data underwent extensive data-cleaning procedures to eliminate any erroneous information. That is, online surveys are often associated with inaccuracies caused by respondents who rush through the survey and select the first response without considering its content, as well as those who intentionally provide nonsensical feedback; these responses should be eliminated. Furthermore, outliers were identified, and histograms were created to evaluate the data. It was concluded that there were no notable deviations present. Most of the questions in the online survey were formulated in a manner that motivated respondents to provide answers, thereby ensuring the absence of missing data [37].

The independent variables in this study were the characteristics of nursing faculty members and their perception of their academic nursing team leaders' authentic leadership. The dependent variable was the psychological safety of the nursing faculty members [37]. To answer the first and second research questions related to concepts measured in the current study, authentic leadership and psychological safety were treated as interval variables; thus, descriptive statistics, including means, standard errors of the means, medians,

interquartile (IQR), range, and 95% confidence interval (CI) of the mean, were generated using SPSS version 25 [39]. The third research question assessed whether the perceived academic nursing team leaders' authentic leadership predicts nursing faculty members' psychological safety using the general linear model (GLM) with an alpha level of 0.05. The GLM is an extension of linear regression that can be used with a wide range of types of data while allowing for flexible modeling choices and diverse responses, resulting in robust predictions [37]. Prior to running the GLM, the assumptions of normality, linearity, sphericity, and independence associated with a linear regression model were assessed, and no significant deviations were observed [37].

3. Results

The majority of the nursing faculty members consisted of married women ($N = 72$, 68.60%; $N = 81$, 77.10%), ranging from young to middle aged as they aged less than 34 years ($N = 87$, 82.90%). Nursing faculty held Master's degrees or higher ($N = 67$, 63.80%) and were employed full time ($N = 98$, 93.30%) in governmental universities ($N = 80$, 76.20%) that were accredited ($N = 99$, 94.30%) and focused on quality improvement ($N = 97$, 92.40%). These faculty members had an above-average tenure of four years or more ($N = 73$, 69.50%) and worked in teams of varying sizes, with over fifteen members on average ($N = 55$, 52.40%). However, the ideal collaborative team size is typically between four and eight members (Table 1). The sample characteristics are similar to those of nursing faculty members working in higher education organizations in Jordan.

3.1. Perceived Team Leader's Authentic Leadership. Nursing faculty members in the study generally rated their academic nursing team leaders as having high levels of authentic leadership (based on the scoring of Sexton et al., 2006) [38]. For the whole sample, the nursing faculty members rated high (agreed) the authentic leadership of their academic nursing team leaders (mean = 3.65 and mean SE = 0.08). In academics, authentic nursing leaders were perceived to listen to the ideas of others before making decisions (mean = 3.90 and mean SE = 0.10). On the other hand, authentic nursing leaders need to learn how not to allow the group to pressure them (mean = 3.45 and mean SE = 0.11). They should also learn to openly share their feelings with others (mean = 3.46 and mean SE = 0.11) (Table 2).

3.2. Perceived Team Members' Psychological Safety. Based on the scoring of the study in [38], high psychological safety scored four or higher, while poor psychological safety scored three or below. For the whole sample, the nursing faculty members rated their psychological safety poorly (mean = 3.10 and mean SE = 0.06). The highest-rated nursing faculty members' psychological safety item was that they felt their unique skills and talents were valued and utilized when working with team members (mean = 3.54 and mean SE = 0.09). However, the lowest-rated nursing faculty

TABLE 1: Nursing faculty members' characteristics (N = 105).

Characteristics	N (%)
<i>Gender</i>	
Male	33 (31.40)
Female	72 (68.60)
<i>Marital status</i>	
Single	24 (22.90)
Married	81 (77.10)
<i>Age</i>	
≤34 years	18 (17.10)
>34 years	87 (82.90)
<i>Time commitment</i>	
Full-time work	98 (93.30)
Part-time work	7 (6.70)
<i>Level of education</i>	
Baccalaureate degree (clinical instructor)	38 (36.20)
Master's degree or above (faculty members)	67 (63.80)
<i>Accreditation initiatives in organizations</i>	
Yes	99 (94.30)
No	6 (5.70)
<i>Quality initiatives in organizations</i>	
Yes	97 (92.40)
No	8 (7.60)
<i>Number of tenures at work</i>	
≤4 years	32 (30.50)
>4 years	73 (69.50)
<i>Team size at work</i>	
≤15 members	55 (52.40)
>15 members	50 (47.60)
<i>The sector of work</i>	
Governmental	80 (76.20)
Private	25 (23.80)

members' psychological safety items were holding mistakes against the faculty member (mean = 2.97 and mean SE = 0.10) and having difficulty asking others for help (mean = 2.97 and mean SE = 0.11) (Table 3).

3.3. Predictors of Perceived Team Members' Psychological Safety. Before addressing the third research inquiry, correlations were documented. The psychological safety of nursing faculty members demonstrated a significant, unfavorable, and moderate correlation with their marital status ($r = -0.204$ at an alpha of 0.05). In addition, it exhibited a significant, favorable, and moderate correlation with the size of the team ($r = 0.255$ at an alpha of 0.01).

The GLM indicated that the perceived authentic leadership of academic nursing team leaders did not influence the psychological safety of nursing faculty members. The size of the team was the only factor that predicted the psychological safety of nursing faculty members ($B = 2.044$ and p value = 0.040). The model was not significant ($F(df = 12) = 1.57$, p value = 0.112, and $R^2 = 0.171$, Table 4), and it explained only 6.30% of the variance in the mean score of nursing faculty members' psychological safety. This result suggests that other unmeasured factors likely have a more significant role in promoting nursing faculty members' psychological safety.

4. Discussion

This research examined the variables and predictors that influence how nursing team leaders are seen as authentic leaders by their faculty members and how this affects the psychological safety of the nursing faculty members. Surprisingly, the perceived authentic leadership of academic nursing team leaders did not have an impact on the psychological safety of nursing faculty members, which goes against what I had anticipated.

4.1. Perceived Team Leader's Authentic Leadership. Nursing faculty members perceived their academic nursing team leaders as highly authentic; this high rating of leaders is similar to that of Hassan and Din [1] and Lee et al. [11]. Authentic leadership should be consistently demonstrated, as it is associated with numerous beneficial outcomes for employees, such as increased job satisfaction and commitment [21]. These outcomes may also extend to nursing faculty members.

The most crucial quality displayed by academic nursing team leaders who are viewed as genuine is their willingness to listen to others' ideas before making decisions, similar to Alzghoul et al. [36]. This attentive listening cultivates a participatory approach to decision-making, empowering faculty members to contribute their innovative thoughts [1, 40], which in turn cultivates a feeling of psychological security [41]. This collaborative decision-making process also nurtures a constructive team dynamic grounded in mutual trust and psychological safety [40, 41].

The lowest mean of perceived academic nursing team leaders' authentic leadership was that the leader did not allow the group to pressure them. In the academic nursing landscape, team leaders often face the challenge of maintaining their authentic leadership. A key aspect is their ability to resist undue pressure from the group they lead. Navigating the hectic environment of academia, all academic leaders must shoulder significant responsibilities in managing their own stress and conflicts, as well as those experienced by their team members. Thus, it is crucial to prevent burnout among both leaders and faculty, a factor that research has shown can mediate the influence of authentic leadership on nurses' decisions to leave their roles [11, 19, 20]. Preventing burnout is particularly relevant for nursing academics.

Regrettably, our nursing team leaders in academia refrained from openly expressing their emotions to others. This type of behavior should be reduced and avoided in order to improve academic outcomes. However, it is natural for people to reveal only emotions that match their resolve, as supported by Purwanto et al. [42]. This is an essential component of one's psychological wellbeing [42].

4.2. Perceived Team Members' Psychological Safety. Nursing faculty members reported experiencing a concerning lack of psychological safety, consistent with findings from previous studies [43]. Psychological safety is a critical factor for both employee wellbeing and organizational

TABLE 2: Nursing faculty members' perceptions of their academic nursing team leaders' authentic leadership (N = 105).

Items	Mean	Mean (SE)	Median	IQR 25 th -75 th	Range	95% confidence interval	
						Lower	Upper
(1) My leaders can list three of their greatest weaknesses	3.65	0.11	4	3-5	4	3.42	3.89
(2) My leaders' actions reflect their core values	3.71	0.11	4	3-5	4	3.48	3.94
(3) My leaders seek others' opinions before making up their own minds	3.70	0.11	4	3-5	4	3.47	3.93
(4) My leaders openly share their feelings with others	3.46	0.13	4	3-5	4	3.20	3.72
(5) My leaders can list three of their greatest strengths	3.79	0.11	4	3-5	4	3.56	4.02
(6) My leaders do not allow group pressure to control them	3.45	0.11	4	3-5	4	3.22	3.68
(7) My leaders listen closely to the ideas of those who disagree with them	3.66	0.10	4	3-5	4	3.46	3.87
(8) My leaders let others know who they truly are as persons	3.76	0.10	4	3-5	4	3.55	3.97
(9) My leaders seek feedback as a way of understanding who they really are as persons	3.79	0.10	4	3-5	4	3.59	3.99
(10) Other people know where my leaders stand on controversial issues	3.60	0.11	4	3-5	4	3.38	3.83
(11) My leaders do not emphasize their own points of view at the expense of others	3.60	0.10	4	3-5	4	3.40	3.81
(12) My leaders rarely present a "false" front to others	3.49	0.10	4	3-5	4	3.28	3.70
(13) My leaders accept the feelings they have about themselves	3.63	0.11	4	3-5	4	3.40	3.86
(14) My leaders' morals guide what they do as leaders	3.77	0.10	4	3-5	4	3.54	4.00
(15) My leaders listen very carefully to the ideas of others before making decisions	3.90	0.10	4	3-5	4	3.69	4.11
(16) My leaders admit their mistakes to others	3.49	0.12	4	3-5	4	3.24	3.74
Total score	57.95	1.37	60	52-68	64 (16-80)	55.22	60.68
Total mean score	3.65	0.08	3.80	3.35-3.80	4 (1-5)	3.48	3.82

This 16-item scale rated from 1 (strongly disagree) to 5 (strongly agree). SE = standard error of the mean; 95% confidence interval (CI) of the mean using standard errors.

TABLE 3: Nursing faculty members' perceptions of their own psychological safety variables ($N = 105$).

Items	Mean	Mean (SE)	Median	IQR	Range	95% confidence interval	
						Lower	Upper
(1) If I make a mistake on this team, it is often held against me	2.97	0.10	3	2-4	4	2.77	3.18
(2) Members of this team can bring up problems and tough issues	3.12	0.10	3	2-4	4	2.92	3.33
(3) People on this team sometimes reject others for being different	3.07	0.11	3	2-4	4	2.85	3.29
(4) It is safe to take a risk on this team	3.10	0.09	3	2-4	4	2.90	3.29
(5) It is difficult to ask other team members for help	2.79	0.11	3	2-4	4	2.56	3.02
(6) No one on this team would deliberately act in a way that undermined my efforts	3.11	0.10	3	2-4	4	2.92	3.31
(7) Working with members of this team, my unique skills and talents are valued and utilized	3.54	0.09	3	2-4	4	3.35	3.74
Total score	21.70	0.43	21	19-24	28 (7-35)	20.83	22.57
Total mean score	3.10	0.06	3	2.71-3.00	4 (1-5)	2.97	3.22

This 7-item scale rated from 1 (strongly disagree) to 5 (strongly agree). SE = standard error of the mean; 95% confidence interval (CI) of the mean using standard errors.

TABLE 4: The perceived academic nursing team leaders' authentic leadership and subject's characteristics as predictors of nursing faculty members' psychological safety using GLM ($N = 105$).

Dependent and significant predictors	B^*	T -test	P value	R^2	Adjusted R^2	F -test (df) **(P value)
The total score of nursing faculty members' psychological safety				0.171	0.063	1.57 (12) (0.112)
The total score of perceived leaders' authentic leadership	0.005	0.17	0.865			
Gender	-1.203	-1.18	0.239			
Marital status	-1.897	-1.66	0.100			
Age						
Time commitment	-0.212	-0.11	0.908			
Level of education						
Accreditation initiatives in organizations	1.877	0.95	0.343			
Quality initiatives in organizations	-1.465	-0.89	0.375			
Number of tenures at work	1.551	1.43	0.156			
Team size at work	2.044	0.98	0.040			
The sector of work	-0.926	-0.82	0.410			

* B = unstandardized coefficients; ** $P < 0.001$ (2-tailed).

success [43], so this deficiency is problematic. Our academic leaders must, therefore, strive to cultivate an environment of trust and security where nursing faculty can thrive and achieve new heights. Building this foundation of trust relies on authentic engagement and decision-making within the academic nursing realm. Therefore, authentic leaders should resist external pressures and encourage open expression of thoughts and emotions. Ideally, academic leaders will be reliable and dedicated to the welfare of their staff [43], such as the nursing faculty members in our case. When faculty feel their unique capabilities are valued and utilized by their team, they experience a sense of psychological safety [3, 6], which allows them to fulfill their essential roles in teaching, research, and management and to contribute innovative and creative ideas, akin to Abu Rabia [35].

In contrast, nursing faculty members felt uneasy because their superiors in the academic nursing world would use their mistakes against them. They also faced difficulties in getting help from others. These results indicate a lack of trust and teamwork in the academic nursing field. When there is no trust, people hide their thoughts and avoid admitting their errors, fearing consequences [43]. However, when professors feel safe, they are more likely to address their wrongdoings openly. Trust is the essential basis for building a secure and encouraging environment.

4.3. Predictors of Perceived Team Members' Psychological Safety. Correlations indicated that the psychological well-being of nursing faculty members was significantly, negatively, and moderately linked to their marital status. This discovery is noteworthy and original. This result contradicts Xia et al. [44], who reported no differences in the self-psychological safety maintenance of nurses during the COVID-19 pandemic based on the marital status. Given that most of our participants were married women who work as nursing faculty members, we could cautiously infer that single female nursing academics may experience a higher level of psychological safety. This is because married women, particularly those in troubled marriages, are more prone to psychological issues that have a detrimental impact on their

sense of safety. It is worth noting that working women in Jordan face significant financial burdens due to shared household responsibilities.

In addition, female nurses bear the primary responsibility for managing their families, particularly when it comes to raising children. The cultural norms largely influence this situation in the Arab region, where men have limited involvement in household tasks. This result is consistent with Cañadas-De la Fuente et al. [45], who reported that married females with children are prone to more work burnout, which is expected to lower their psychological safety, which may apply to nursing faculty members.

The psychological safety of nursing faculty members correlated with the team size, supported by Albritton et al. [46]. They revealed a minimum team size of 9-10, close to the current team size, at which team psychological safety and learning behaviors become critical for team effectiveness. Effective team size promotes a sense of psychological safety at the team level. In turn, a team's belief in a safe and trusted environment is promoted, implying more brainstorming, critical thinking, effective problem solving and decision-making, better job performance, and creativity [36].

Per predictors, contradictory to my expectations, the GLM indicated that the perceived academic nursing team leaders' authentic leadership did not predict nursing faculty members' psychological safety (contradictory to Anugerah et al. [47] and Maximo et al. [48]). This result is consistent with the results of a study conducted in Jordan about academic nursing team leaders' authentic leadership and its relation with knowledge sharing among the team and nursing faculty members' creativity [3]. Authentic leadership did not predict knowledge sharing within the team or nursing faculty members' creativity [3]. Moreover, Chaudhary and Panda [49] reported that psychological safety failed to transfer the impact of authentic leadership on work engagement and creativity. Even though the prediction model was insignificant, which is believed to be related to confounding variables, the current researcher still strongly believes in the roles of authentic leaders in their team members' psychological safety. The insignificant model calls for studying noninvestigated variables that may have a role

in promoting faculty members' psychological safety, such as individual personality traits, job satisfaction, or external stressors. More specifically, personality traits are an individual's distinctive character or qualities over time. As the healthcare and educational environment is complex and customer centered, multiple competing stressors, such as workload, shortage of staff, and time pressures, result in many negative consequences, such as job satisfaction and turnover [50]. The authors reported that the personality of the staff, including faculty members, will likely play a significant role in team dynamics, especially particularly when they are under pressure. Staff responses to stressors and, in turn, their job satisfaction are influenced by their personalities [50], regardless of the type of stressors and their magnitudes.

The study findings suggest that nursing faculty members' perceptions of their team leaders' authentic leadership did not significantly influence their sense of psychological safety. This result aligns with Elrehail et al.'s [2] observation that authentic leadership had no impact on innovation within Jordanian universities, which may also apply to psychological safety, as it is closely linked to creativity and innovation. However, this finding differs from the conclusions of Alilyani et al. [13] in Saudi Arabia, who found that authentic leadership positively and directly influenced team effectiveness, nurses' work engagement, and psychological safety. Obviously, authentic leadership and psychological safety are presented in their unique organizational, cultural, and county contexts.

Accounting for the county context, for example, given the significant changes taking place in higher education institutions, particularly in terms of quality and accreditation efforts on national and international levels, academic nursing settings in Jordan are being influenced by various forms of leadership. These alternative leadership styles, such as entrepreneurial and nonauthoritative leadership, have an impact on nursing academics [51], along with energizing workplace friendship and authentic communication. In addition, leadership that prioritizes knowledge and fosters innovation in academic settings is crucial, as is supportive leadership [11, 19, 20, 52] that encourages creativity [11, 19, 20, 51, 53]. These different leadership approaches are necessary in the ever-changing and unpredictable academic work environment.

Considering the unique organizational context, the size of the team was the only factor that affected the psychological safety of nursing faculty members although the impact was not significant. It is worth noting that a larger team could potentially help our nursing faculty members overcome their perceived lack of psychological safety. In such a scenario, they would be more inclined to support each other, especially when facing criticism for their mistakes. Albritton et al. [46] revealed a minimum team size of 9-10, close to the current team size, at which psychological safety becomes critical for teamwork. This result adds to the nursing authentic leadership literature; that is, the common demographic variables linked to nursing authentic leadership are age and experience. For example, Puni and Hilton reported that junior nurses perceive their work supervisors as authentic leaders [54].

4.4. Limitations and Implications for Research. Additional research is necessary to explore various aspects of the topic at hand. For instance, it would be beneficial to conduct further studies on how marital status affects the psychological wellbeing of nursing faculty members. It has been observed that single female faculty members tend to feel more secure in this regard. However, it is important to note that the data collected for this study were limited in scope, and as it was obtained from only two governmental and two private nursing schools, using the convenience snowball sampling method might not be representative of all nursing faculty members in Jordan.

Furthermore, the snowball inclusion technique employed in the study also restricts information regarding the number of individuals approached to participate, as well as the number of organizational units or managers involved. Moreover, while using convenience and snowball samples is practical, they are prone to selection biases and potential systematic errors, limiting their representativeness and generalization [37].

The use of cross-sectional design is a major limitation in the current research as it is difficult to establish cause-and-effect relationships. It is only a snapshot; thus, it cannot be used to analyze behavior over a period or establish long-term trends [37], such as those related to authentic leadership and psychological safety.

It is also worth mentioning that the findings may have limited applicability to other countries, as the data were collected specifically in Jordan. As such, it would be valuable to conduct further research in different cultural settings, as academic environments in Jordan, particularly within nursing, tend to be highly collectivist and hierarchical, with a significant power distance culture, as seen in previous studies [7, 8, 14].

Future research could benefit from a more diverse random sample and deeper analysis of psychological safety underlying factors. Furthermore, the researchers should consider alternative research designs, such as qualitative methods and longitudinal design, to overcome the limitations of the current cross-sectional design. In addition, there is a need to investigate different types of nursing leadership in relation to the psychological safety of nursing faculty members. Understanding why the authentic leadership of academic nursing team leaders did not support psychological safety is crucial. The insignificant prediction model mandates studying other nonstudied variables that could influence faculty members' psychological safety, such as job satisfaction and tenure staff commitment, individual personality traits, or external stressors. Mediation studies can provide insights into how the authentic leadership of academic nursing team leaders impacts the psychological safety of nursing faculty members. Furthermore, validation studies can explore additional dimensions of authentic leadership that are associated with psychological safety beyond self-awareness, internalized morals, balanced processing, and relational transparency [53].

4.5. Implications for Education and Practice. In Jordan, the academic nursing settings have a culture of high-power distance, which is hierarchical and collectivist. [7, 8, 14]

Such professional hierarchy is a barrier to psychological safety; faculty members would have limited freedom to speak and be themselves, contrary to leaders in higher positions. This is consistent with our sample reporting of insecurity because their superiors in the academic nursing field would hold their errors against them. Our faculty members also faced challenges in seeking assistance from others. These behaviors demonstrate a deficiency in trust and collaboration fueled by the high-power distance environments, supported by Edmondson [6] and De Smet et al. [3].

Hierarchical and collectivist cultures contribute to negative outcomes, such as workplace bullying and incivility [8]. High power distance cultures have certain traits, such as limited access to information for those in authority, the use of power to establish social order, division of the work environment into classes with restrictions, and a focus on outcome rather than quality of treatment and relationships [8, 14]. To mitigate the impact of this culture in academic nursing settings, it is important to develop low power distance cultures, supporting our nursing faculty members reporting that they feel psychologically safe when their unique skills and talents are valued and utilized when working with team members, calling for authentic leadership behaviors.

Hierarchical and collectivist cultures should be transformed into low-power distance cultures. The latter can be achieved by promoting independence, minimizing inequality, considering the balance of power to prevent inequality, and viewing power as a means of accessibility that changes frequently [8, 14]. By creating low-power distance cultures, bullying and incivility can be reduced in academic work environments [8, 14]. In addition, academic nursing team leaders should learn authentic leadership, as it supports the psychological safety of their faculty members [7, 9, 10].

Starting by decreasing the hierarchical and collectivist cultures, it is essential to improve the psychological safety of our nursing faculty members; it is crucial to create positive working conditions in academic settings [35]. It is important to distinguish between healthy and dysfunctional work environments. By cultivating a healthy work environment, we can support the wellbeing and engagement of nursing faculty members, fostering a sense of trust and belonging [35].

The psychological safety among nursing faculty members can be enhanced through many leadership interventions [7, 10]. Called “practical enablers of psychological safety,” O’donovan and Mcauliffe [55] reported that assessing these enablers is the first step in developing and maintaining staff’s psychological safety. In healthcare, these enablers were grouped according to the following five themes: priority for patient safety, improvement or learning orientation, support, familiarity with colleagues, status, hierarchy and inclusiveness, and individual differences [55]. In academic settings, these enablers could be an improvement or learning orientation, support, familiarity with colleagues, status, hierarchy inclusiveness, and individual differences.

The current study reveals that these faculty members feel a sense of appreciation and recognition for their abilities and contributions, similar to other studies [3, 6]. Authentic academic nursing team leaders must foster and maintain such leadership behaviors, reflecting improvement, support, and inclusiveness of psychological safety enablers. Conversely, nursing faculty members express concerns about their errors being used against them and find it challenging to seek assistance from others, demonstrating status and hierarchy psychological safety enablers [3, 55]. Authentic academic nursing team leaders should promptly address these instances of low-rated psychological safety, as they hinder the establishment of a supportive and secure environment, demonstrating the support, familiarity with colleagues’ psychological safety enabler, and inclusiveness while addressing individual differences [6, 55].

5. Conclusion

The nursing faculty perceived their academic nursing team leaders to display strong authentic leadership, but they felt that their own psychological safety was lacking. Interestingly, the level of authentic leadership exhibited by the team leaders did not have any impact on the psychological safety of the faculty members. The only factor that predicted the psychological safety of the nursing faculty members was the size of the team they worked with. However, this model was ultimately deemed insignificant, stressing the need for further research related to some unstudied variables, such as individual personality traits, job satisfaction, or external stressors.

Authentic leadership initiatives are necessary to establish favorable working conditions for nursing faculty. It should be noted that the cultivation of psychological safety cannot be achieved in a short time.

Further investigation involving a diverse and extensive pool of participants should be conducted across various nations and cultures, utilizing different leadership styles and research methodologies, such as qualitative research, to enable a deeper understanding of the reasons why the perceived authentic leadership of academic nursing team leaders did not have a predictive effect on the psychological safety of nursing faculty members [56, 56].

Data Availability

The data used to support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethical Approval

The Institutional Review Board (IRB) of the Hashemite University, Jordan, approved the study; the reference numbers are 2/1/20/2021 (Oct. 18, 2020) and 11/8/2021/2022 (Jul. 25, 2022). In the invitation letter, participants were informed that they were providing their consent by submitting the survey. It was emphasized that participation in

the study was entirely voluntary, allowing participants to withdraw at any point. Only codes were used to identify participants to ensure anonymity, and their email addresses were not retained in the dataset. The data remained confidential as they were securely stored on the researcher's computer.

Consent

A written statement was clearly stated on the front page of the survey.

Conflicts of Interest

The author declares that there are no conflicts of interest.

Authors' Contributions

MTM did the whole work.

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Research Article

Perceived Organizational Effectiveness during a Public Health Crisis and Moral Wellness among Nurse Leaders: A Cross-Sectional Study

Cynda Rushton ^{1,2}, Katie Nelson ³, Alanna Bergman ¹, Danielle Boyce ⁴,
Christian Jenkins ¹, Sandra M. Swoboda ^{1,5} and Ginger Hanson ¹

¹Johns Hopkins University School of Nursing, Baltimore, MD, USA

²Johns Hopkins Berman Institute of Bioethics, Baltimore, MD, USA

³Johns Hopkins Bloomberg School of Public Health, Center for Indigenous Health, Baltimore, MD, USA

⁴Johns Hopkins University School of Medicine, Center for Data Science in Emergency Medicine, Baltimore, MD, USA

⁵Johns Hopkins University School of Medicine, Baltimore, MD, USA

Correspondence should be addressed to Cynda Rushton; crushto1@jhu.edu

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Background. During a public health crisis, such as the COVID-19 pandemic, nurse leaders coordinate timely high-quality care, maintain profit margins, and ensure regulatory compliance while supporting the health and wellbeing of the nursing workforce. In a rapidly changing environment where resources may be scarce, nurse leaders are vulnerable to moral injury; however, organizational effectiveness may help to buffer moral challenges in healthcare leadership, thereby fostering greater moral resilience and reducing turnover intention. **Aim.** To understand mechanisms by which perceived organizational effectiveness contributes to nurse leaders' moral wellness (i.e., moral injury and moral resilience) and thereby effects work outcomes (i.e., engagement, burnout, and turnover intention). **Methods.** A cross-sectional survey of nurse leaders ($N = 817$) from across the United States was conducted using a snowball methodology, independent t -tests, and structural equation modeling to examine theoretical relationships among moral injury, moral resilience, and organizational effectiveness. **Results.** Higher ratings on every facet of perceived organizational effectiveness were significantly related to greater moral resilience ($p < 0.001$ for all t -tests) and lower moral injury ($p < 0.001$ for all t -tests) among nurse leaders. Structural equation models indicated both moral resilience and moral injury were significant mediators of the relationship between organizational effectiveness and work outcomes. Moral resilience and moral injury significantly mediated the effect of organizational effectiveness on burnout. Moral resilience was also a significant mediator of the relationship between organizational effectiveness and moral injury. **Conclusion.** Dismantling organizational patterns and processes in healthcare organizations that contribute to moral injury and lower moral resilience may be important levers for increasing engagement, decreasing burnout, and reducing turnover of nurse leaders.

1. Introduction

In public health crises, nurse leaders and frontline nurses are faced with health-related situations, which may overwhelm their capacities to address them [1]. The COVID-19 pandemic is the most recent example in the history of a global public health crisis, which severely strained existing public health infrastructure, taxed hospital resources, and degraded

an already tenuous workforce [2–5]. During these situations, nurse leaders have a vital role in upholding organizations' missions and values, while concurrently leading staff through rapidly changing environments [6]. This requires not only deft skills in communication, leadership, compassion, and resolve but also an ability to prioritize wellbeing and resilience for themselves and their frontline staff. Nurse leaders must support the provision of high-quality care and

represent frontline staff at the organizational level, all while serving as ethical role models [7]. During the COVID-19 pandemic, the challenges nurses faced at the point of care were highlighted [8]. However, the toll the pandemic took on nurse leaders was largely underreported. Many nurse leaders' work occurs "behind the scenes," and as such, their voices and experiences are underreported in the literature with limited acknowledgment by their organizations ([9]—in press) and, therefore, are poorly understood.

1.1. Moral Injury. Nurse leaders must navigate a myriad of ethical and moral challenges and adversities that may cause moral suffering and contribute to burnout, which can lead to turnover intention and moral injury (MI) [10, 11]. These experiences may be particularly heightened amid a public health crisis [8, 9]. When moral suffering is conceived as a continuum, MI is viewed as the most corrosive type of moral suffering ([12], p. 52–76; 2023). MI occurs when persons perceive that they or others have violated their moral core producing symptoms, such as stress, burnout, and turnover intention [13]. Often, it includes betrayals or transgressions by self or others, particularly financial and administrative leaders [4], and can be associated with post-traumatic stress disorder, suicide ideation/attempts, and other mental health symptoms [2, 14]. Among nurses, studies have shown clinically significant MI symptoms (>36) among frontline nurses given their high-intensity work environment(s) and physical/emotional strain that comes with providing patient care [15, 16]; however, the degree of MI among nurse leaders in these situations is largely unexplored. Frontline nursing staff are not experiencing the burden of the pandemic alone [8]; the impact on nurse leaders is likely also significant. A 2022 survey by the American Organization for Nursing Leadership (AONL) found that emotional health of staff and retention are two of the three top challenges nurse leaders were facing in response to the pandemic. Of the AONL survey respondents, 38% of the nurse leaders are "maybe" or "definitely" leaving their roles, of which 43% identified the reason as burnout/exhaustion [17].

1.2. Moral Resilience. Moral resilience (MR) is "the capacity of an individual to restore their integrity in response to moral adversity" ([12], p. 68). Moral resilience encompasses personal integrity, relational integrity, buoyancy, self-regulation/awareness, moral efficacy, and self-stewardship [18]. Moral resilience has been posited as a protective resource that can reduce the detrimental effect of moral suffering [19]. A strengths-based approach, MR, has been shown to be inversely related to MI [16] and moral distress [5]. Higher levels of moral resilience are inversely correlated with stress, anxiety, and depression [5] and decreases in burnout and turnover intention [10]. Understanding the relationship of MR in response to potentially morally injurious events during a pandemic can illuminate opportunities for prevention and intervention.

1.3. Organizational Effectiveness. Nurse leaders are in a precarious position, balancing staff, and personal wellbeing while also meeting regulatory requirements and organizational expectations [20]. During a public health crisis like the COVID-19 pandemic, leaders depend upon the organization's structures, processes, and governance mechanisms to achieve desired outcomes. Organizational effectiveness (OE) is a complex measure of how well an organization maintains and delivers on its mission and services, supports personnel, and establishes a culture of employee commitment and satisfaction [21]. In contrast, less effective organizations are characterized by reduced professional autonomy and perceived value within the organization, and greater exposure to circumstances that violate and eventually erode integrity and moral capability [22]. During the pandemic, OE was constrained and contributed to symptoms of MI. A study of nurses, physicians, advanced practice providers, and others showed that facets of OE contributed to both MI and MR [16]. As organizational effectiveness was degraded, symptoms of MI increased, and MR decreased [16].

Foreshadowing the pandemic, the National Academy of Sciences, Engineering, and Medicine (NAEM) established goals for healthcare systems to assess the impact of system demands on employees and improve employee wellbeing [23]. A contributing factor to clinician wellbeing includes practicing in alignment with ones' professional values and working in an environment that enables ethical practice [24]. Cultivating an ethical climate that fosters wellbeing and MR is a challenge that requires a multipronged approach at both the individual and organizational levels [4, 25, 26]. Leading organizations, such as NAEM [23], the U.S. Surgeon General [27], the National Institute for Occupational Safety and Health [28], and the United Nations [3], have identified key priority areas, which include mental health support for healthcare providers and frameworks for systemic change, further echoing the call for action within healthcare institutions. The adoption of these recommendations in the United States and globally was in its infancy when the pandemic began in March 2020. Effective strategies for expanded occupational health and safety that support frontline staff and nurse leaders require further scientific inquiry [29]. Therefore, the purpose of this study was to examine the following four research questions among a sample of nurse leaders in the United States in the aftermath of the COVID-19 pandemic.

- (1) Are there differences in MR and MI based on whether nurse leaders rate different facets of OE as high or low during a public health crisis? Is nurse leaders' perceived OE associated with differences in MR and MI?
- (2) Does the effect of OE on work outcomes during a public health crisis (i.e., engagement, burnout, and turnover intention) operate through its negative effect on MI among nurse leaders?
- (3) Does the effect of OE during a public health crisis on work outcomes (i.e., engagement, burnout, and turnover intention) of nurse leaders operate through its positive effect on MR?

- (4) Does the effect of OE on MI operate through its positive effect on MR among nurse leaders during a public health crisis?

2. Methods

2.1. Study Design, Setting, and Participants. We conducted a cross-sectional survey via Qualtrics with a sample of nurse leaders from across the United States who were practicing during the COVID-19 pandemic (2020–2022). Using snowball sampling, we recruited nurse leaders in the United States, leveraging members of the American Organization of Nurse Leaders (AONL) to recruit its members, as well as the PI's professional networks (Figure 1). Participants were recruited via email and other communications sent by AONL and the research team, inviting them to complete the online survey. Participants were encouraged to share the survey with other nurse leaders within their networks. Data were collected from August through November of 2022. Inclusion criteria were as follows: (1) serving in a nurse leader role, as defined by the following categories: Chief Executive Officer, Chief Nursing Officer/Chief Nursing Executive, Chief Operating Officer, Vice President, Director, Manager, Specialist/Coordinator, Clinical Staff, Dean/Professor, Consultant, Vendor, or Other Nurse Leader; (2) practicing since at least 2019; (3) living in the United States; and (4) over the age of 18 years. Qualitative data obtained via open-ended questions from this survey were analyzed and published separately [9]. Elements of those data are described in the discussion to further contextualize and explain the quantitative findings. The Johns Hopkins Institutional Review Board deemed this study to be exempt; survey completion implied consent to participate.

2.2. Variables

2.2.1. Demographics and Work Characteristics. All demographic and work characteristic covariates were categorical; therefore, each was dummy coded for inclusion in preliminary regression analyses and final path analyses. Age included five categories; education had three categories; and religion had five categories. For all analyses, role was recoded into the following three categories: nurse manager (reference group), executive, and other nurse leader. Race included five categories; primary work population included three categories; and time in current role had six categories.

2.2.2. Organizational Effectiveness. OE was measured via 18 items adapted from a prior study involving HCWs during the pandemic [16]. The process for adapting the scale involved literature review, input from nurse leaders practicing during the pandemic, and responses from an AONL-sponsored focus group. The original items ($N=10$) were included in addition to eight new items that were specific to nurse leaders during the COVID-19 pandemic. Participants rated items from 1 (not at all effective) to 5 (extremely

effective). An exploratory factor analysis using principal axis factoring was conducted. A single factor was extracted, which explained 57.91% of the variability in the items. All communalities were greater than or equal to 0.50. All factor loadings were greater than or equal to 0.70. The exploratory factor analysis provided evidence for the construct validity of the scale. The total score was computed by taking the mean of all items, whereby higher scores indicate higher OE. The Cronbach's alpha reliability for this sample was 0.96.

2.2.3. Moral Injury. The Moral Injury Symptoms Scale-Healthcare Professionals (MISS-HP) comprises 10 items rated on a scale from 1 (strongly agree) to 10 (strongly disagree) to assess MI symptoms [15]. The total score is computed by summing the items, with scores ranging from 10 to 100; higher scores indicate higher MI. The Cronbach's alpha reliability for our study was 0.71.

2.2.4. Moral Resilience. The Rushton Moral Resilience Scale-16 (RMRS-16) is a 16-item scale rated on a 4-point Likert scale from 1 (disagree) to 4 (agree) to assess moral resilience [30]. The scale is divided into four subscales as follows: (1) response to moral adversity; (2) personal integrity; (3) relational integrity; and (4) moral efficacy—each of which includes four items. The total RMRS score was computed by averaging item responses, where a higher score indicates greater moral resilience with scores ranging from 1 to 4. Overall reliability for the total RMRS in our study was 0.85.

2.2.5. Work Engagement. We used a modified 8-item version of the Utrecht Work Engagement Scale-9 (UWES-9) [31]. Participants rated frequency on a scale from 1 (never) to 6 (always, everyday). Total score was computed by averaging the items, where higher scores indicate greater work engagement, and scores range from 1 to 6. Reliability for our study was 0.91.

2.2.6. Burnout. We used a 4-item scale validated by Profit and colleagues [32] to measure emotional exhaustion as a component of burnout. Items were rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The total score was configured by averaging the four items, subtracting 1, and multiplying by 25 such that scores range from 0 to 100 where higher scores indicate higher burnout. Cronbach's alpha for our study was 0.90.

2.2.7. Turnover Intention. Turnover intention was measured using the 3-item "leave job" subscale developed by Dotson and colleagues [33]. Wording was changed from "nursing" to "nursing leadership" to make items more relevant to the population. Items were rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The score was computed by averaging the three items; higher scores indicate higher turnover intention. Cronbach's alpha for our study was 0.93.

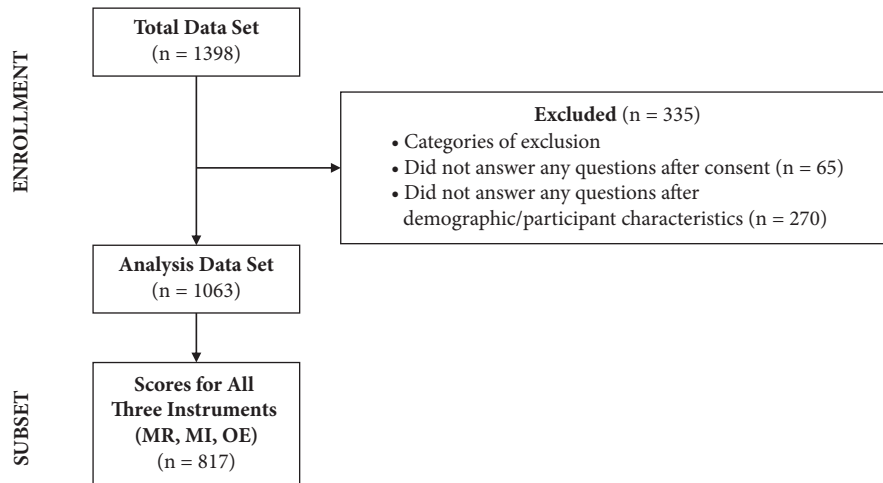


FIGURE 1: CONSORT diagram.

2.3. Statistical Methods. Data were analyzed using STATA Release 18 (StataCorps; College Station, TX). Frequency analyses were run to describe the overall sample. We began by recoding the OE facets so that low OE = not at all/slightly/moderately effective and high OE = very/extremely effective to assess relationships to moral resilience and MI. We then used independent *t*-tests with each of the 10 facets of OE as independent variables and moral resilience and MI as dependent variables. We reported the Cohen's D effect size for each *t*-test.

Structural equation models (SEMs) were generated to estimate complex models with multiple mediation effects, while controlling for other hypothesized relationships to circumvent any potential bias. We tested three mediation relationships: 1) organization effectiveness > moral resilience > work outcome; (2) OE > MI > work outcome; and (3) MR > MI > work outcome. We ran separate models for each work outcome (burnout, work engagement, and turnover intention) because the theoretical relationships between these variables were not the primary focus of this analysis. Goodness-of-fit indices used to evaluate the overall model were the chi-square test, RMSEA, p-close, CFI, and TFI. Guidelines for what represents a good fit included were as follows: (1) a chi-square value that is not statistically significant; (2) RMSEA values of ≤ 0.06 [34, 35]; (3) P-close values of greater than 0.05 since this is a test of whether RMSEA is significantly greater than 0.05; and (4) CFI and TFI values of ≥ 0.95 [34, 35].

We used the *medsem* command in Stata, a post-estimation command run after estimating each model, to generate estimates of each indirect (mediation) effect and associated standard error and used bootstrapping [36]. The *medsem* command also generates effect sizes for the indirect effect referred to as RIT and RID [37]. The RIT effect size is a ratio of the indirect effect to the total effect and is interpreted as the percentage of the effect of the independent variables on the dependent variable (direct effect) that goes through the mediator. RID is a ratio of the indirect effect and

the direct effect, and it is interpreted as the proportion larger the indirect or mediation effect is as opposed to the direct effect.

Before running the SEM models, we ran preliminary simple linear regression analyses to determine which demographic and work characteristics to use as covariates for each outcome (i.e., MR, MI, work engagement, burnout, and turnover intention) in the path analyses. Any of these variables that were significantly related to an outcome at this stage were included as a predictor of that variable in the path analysis.

3. Results

3.1. Participants. The study included a total sample of 1063 nurse leaders from across the United States, of which 817 individuals completed online surveys for MR, MI, and OE, and this was our final analysis sample for this study. Of the 817 individuals who completed all three surveys, 90.1% were females and 89.3% were White. Most leaders (84.8%) were between 36 and 65 years of age and had graduate degrees (86.6%). The race and ethnicity of this nursing leader sample was largely White (89.3%) and non-Hispanic (95.6%). Over half (58.9%) worked with adult patients, and 31.6% reported being in their current role for less than three years (Table 1). The three main roles held by the participants were as follows: Chief/VP (24.8%), Director (32.2%), and Manager (29.4%).

3.2. Relationship of OE with MR and MI. A series of independent *t*-tests with Cohen's D effect sizes were conducted to examine whether there were differences in MR and MI between nurse leaders who rate different facets of OE as high or low (Table 2). For every facet of OE, nurse leaders who rated their organization as high on that facet experienced higher moral resilience ($p < 0.001$ for all *t*-tests) and lower MI ($p < 0.001$ for all *t*-tests) than nurse leaders who rated their organization as low on that facet. All effect sizes were in

TABLE 1: Demographic characteristics of nurse leaders ($N = 817$).

Variable	<i>N</i>	%
Age ($N = 817$)		
18–35 years old	46	5.6
36–45 years old	167	20.4
46–55 years old	244	29.9
56–65 years old	282	34.5
Over 65 years old	78	9.5
Gender ($N = 812$)		
Male	74	9.1
Female	738	90.9
LGBTQ ($N = 806$)		
No	749	92.9
Yes	57	7.1
Education ($N = 817$)		
Bachelor's or less	126	15.4
Masters	445	54.5
Doctorate	246	30.1
Religion ($N = 817$)		
No religious preference	93	11.4
Christian/Protestant	365	44.7
Roman Catholic	230	28.2
Spiritual but not religious	86	10.5
Other	43	5.3
Role ($N = 817$)		
Chief/VP	203	24.8
Director	263	32.2
Manager	240	29.4
Other	35	4.3
House supervisor	11	1.3
Clinical leader	65	8.0
Race ($N = 806$)		
White	720	89.3
Black	33	4.1
Asian	23	2.9
Other	18	2.2
Multiple races	12	1.5
Hispanic ($N = 813$)		
Yes	36	4.4
No	777	95.6
Primary work population ($N = 816$)		
Pediatric	68	8.3
Adult	481	58.9
Both	267	32.7
Primary work setting ($N = 809$)		
Hospital, short-term acute care	371	45.9
Hospital, long-term acute care	14	1.7
Post-acute care facility (IRF, SNF, CCRC)	10	1.2
Specialty hospital	11	1.4
Health system facility	112	13.8
Health system corporate office	39	4.8
Academic healthcare setting	151	18.7
Critical access hospital	23	2.8
Behavioral health facility	8	1.0
Outpatient, community-based clinic	19	2.3
Ambulatory surgery, specialty care facility	8	1.0
Free-standing emergency, urgent care facility	6	0.7
Other health care setting	37	4.6
Primary work setting location ($N = 813$)		
Urban	440	54.1
Suburban	259	31.9
Rural	114	14.0

TABLE 1: Continued.

Variable	N	%
Primary practice location (N = 581)		
Emergency department	50	8.6
Inpatient—critical care	118	20.3
Inpatient—other	287	49.4
Operating room	24	4.1
Outpatient/ambulatory care	102	17.6
Length of time in current role (N = 817)		
Less than 3 years	258	31.6
About 3–5 years	211	25.8
About 5–10 years	171	20.9
About 10–15 years	81	9.9
About 15–20 years	51	6.2
Greater than 20 years	45	5.5

the medium to large range (absolute values = $|0.47|$ – $|0.91|$), indicating that all are likely important contributors to nurse leaders' wellbeing. One facet, an environment that promotes speaking up about concerns without fear of retaliation, stood out with relatively high effect sizes for both moral resilience (Cohen's $D = 0.68$) and MI (Cohen's $D = -0.91$). The facet, "protocols for filling staffing needs when current staff have fulfilled their assignments", was most strongly related to nurse leader's MR (Cohen's $D = 0.72$). Facets that were most strongly associated with MI (absolute values of Cohen's $D < |0.70|$) included the following: (a) forums with leaders to whom I report to share concerns (Cohen's $D = -0.76$); (b) pathways for requesting ethics consultation or advice (Cohen's $D = -0.77$); and (c) an environment that promotes speaking up about concerns without fear of retaliation (Cohen's $D = -0.91$).

3.3. Path Analysis of the Relationships of OE, MR, and MI with Work Outcomes

3.3.1. Identifying Covariates. Preliminary simple linear regression models were run to determine whether any of the demographic or work characteristics were associated with one of the outcomes of the path analysis models. Potential covariates examined included the following: age, gender, LGBTQ identity, education, religion, occupational role, race, ethnicity, work population, work setting, and length of time in current role. Outcomes for these simple linear regressions included the following: MR, MI, work engagement, burnout, and turnover intention. Covariates that were significantly related to MR included the following: age, education, role, race, work population, and tenure in role. Those covariates significantly related to MI were age, education, religion, and role. Covariates that were significantly related to work engagement included the following: age, education, role, and work population. The following covariates were significantly related to burnout: age, education, and role. The covariates that were significantly related to turnover intention were age

and role. We included covariates that were related to an outcome as covariates for that outcome in the path analyses (A, B, and C).

3.3.2. A: Path Analysis for Work Engagement. SEM was used to simultaneously test our three competing mediation hypotheses for work engagement (i.e., (1) OE- > MR- > work engagement; (2) OE- > MI- > work engagement; and (3) MR- > MI- > work engagement) (Figure 2). The covariates included for each outcome variable in the model are listed in Figure 2. All goodness-of-fit indices indicated a good fit for the overall model (Table 3). All main direct paths in the model were statistically significant (Table 4).

The following is a summary of the hypothesized mediation effects for the path analysis for work engagement.

We examined whether moral resilience mediated the relationship between OE and work engagement controlling for the other predictors in the model. The indirect or mediating effect was statistically significant, $\text{coeff} = 0.05$, $\text{se} = 0.01$, and $p < 0.001$. The RIT effect size indicates that 14% of the effect of OE on engagement is mediated by MR.

We examined whether MI mediated the relationship between OE and work engagement controlling for the other predictors in the model. The indirect or mediating effect was statistically significant, $\text{coeff} = 0.04$, $\text{se} = 0.01$, and $p < 0.001$. The RIT effect size indicates that about 12% of the effect of OE on engagement is mediated by MI.

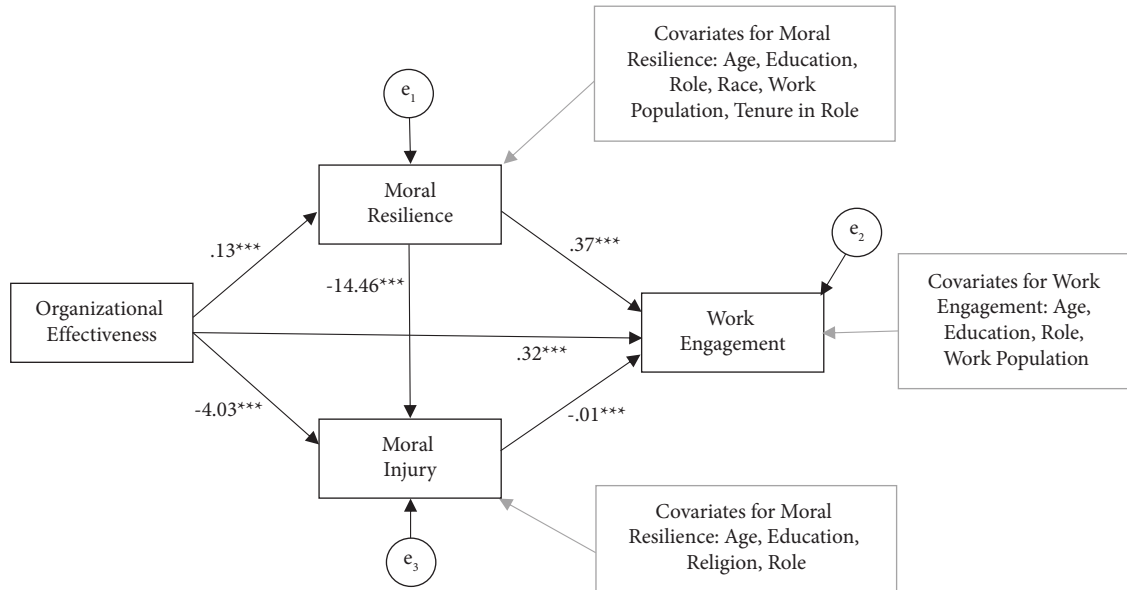
We examined whether MR mediated the relationship between MI and work engagement controlling for the other predictors in the model. The indirect or mediating effect was statistically significant, $\text{coeff} = -1.95$, $\text{se} = 0.23$, and $p < 0.001$. According to the RIT effect size, 33% of the effect of OE on MI is mediated by MR.

3.3.3. B: Path Analysis for Burnout. Next, SEM was used to simultaneously test our three competing mediation hypotheses for burnout: (1) OE- > MR- > burnout; (2) OE- > MI- > burnout; and (3) MR- > MI- > burnout. The

TABLE 2: Association of low vs. high OE with MR and MI.

Item	OE		Moral resilience			Moral injury		
	Low	High	N	M (SD)	p	N	M (SD)	p
Information regarding professional wellness resources	Low	High	412	3.17 (0.41)	<0.001	412	36.87 (13.09)	<0.001
			404	3.36 (0.40)		404	28.25 (11.66)	
Policies regarding crisis response (e.g., the role of triage officers/triage teams)	Low	High	439	3.17 (0.42)	<0.001	439	36.41 (13.33)	<0.001
			364	3.38 (0.39)		364	27.99 (11.36)	
Forums with leaders to whom I report to share concerns	Low	High	407	3.14 (0.41)	<0.001	407	37.15 (13.00)	<0.001
			400	3.40 (0.39)		400	27.88 (11.42)	
Information regarding hazard supplemental compensation	Low	High	499	3.18 (0.41)	<0.001	499	35.75 (13.23)	<0.001
			235	3.41 (0.41)		235	27.32 (11.36)	
Opportunities for individual or team-based approach to address stress	Low	High	484	3.18 (0.41)	<0.001	484	36.00 (13.07)	<0.001
			328	3.39 (0.41)		328	27.54 (11.55)	
Pathways for requesting ethics consultation or advice	Low	High	408	3.14 (0.41)	<0.001	408	37.27 (12.92)	<0.001
			397	3.40 (0.39)		397	27.85 (11.41)	
Information regarding confidential reporting mechanisms	Low	High	309	3.14 (0.41)	<0.001	309	38.09 (13.02)	<0.001
			489	3.35 (0.41)		489	29.20 (12.04)	
An environment that promotes speaking up about concerns without fear of retaliation	Low	High	333	3.11 (0.40)	<0.001	333	39.01 (13.20)	<0.001
			465	3.38 (0.40)		465	28.09 (11.00)	
Communication updates regarding system-based changes	Low	High	333	3.13 (0.40)	<0.001	333	37.59 (13.18)	<0.001
			464	3.36 (0.41)		464	29.07 (11.97)	
Psychological and emotional support for leaders	Low	High	564	3.19 (0.41)	<0.001	564	35.27 (13.12)	<0.001
			247	3.45 (0.39)		247	26.60 (11.09)	
Policies for increasing the number of ICU beds	Low	High	408	3.17 (0.42)	<0.001	408	36.05 (13.29)	<0.001
			320	3.38 (0.38)		320	28.05 (11.48)	
Policies or processes for redeployment of staff	Low	High	453	3.16 (0.41)	<0.001	453	35.96 (13.36)	<0.001
			336	3.40 (0.40)		336	28.07 (11.32)	
Processes for staff to “call-out” without retribution	Low	High	422	3.17 (0.42)	<0.001	422	35.99 (13.32)	<0.001
			371	3.38 (0.40)		371	28.59 (11.80)	
Proactive training of staff to be “crosstrained” to work in multiple areas	Low	High	460	3.17 (0.42)	<0.001	460	35.69 (12.91)	<0.001
			338	3.40 (0.39)		338	28.11 (11.98)	
Protocols for filling staffing needs when current staff have fulfilled their assignments	Low	High	533	3.17 (0.41)	<0.001	533	35.44 (12.81)	<0.001
			273	3.46 (0.37)		273	26.85 (11.57)	
Transparent communication regarding policy or practice changes	Low	High	409	3.16 (0.40)	<0.001	409	36.75 (12.87)	<0.001
			401	3.38 (0.41)		401	28.29 (11.77)	
Budget adjustments to increase resources for nursing workforce	Low	High	473	3.17 (0.41)	<0.001	473	35.84 (13.03)	<0.001
			330	3.40 (0.40)		330	27.95 (11.92)	
Equitable compensation for nurses in same role	Low	High	487	3.17 (0.41)	<0.001	487	35.73 (13.20)	<0.001
			311	3.41 (0.39)		311	27.63 (11.53)	

Note. Cohen's *d* effect sizes: |0.2| = small; |0.5| = medium; |0.8| = large.



Indirect mediation effects:

- OE -> MR -> Work Engagement, Coeff = .05, $p < .001$
- OE -> MI -> Work Engagement, Coeff = .04, $p < .001$
- OE -> MR -> MI, Coeff = -1.95, $p < .001$

FIGURE 2: Path analysis of the relationship among OE, MR, MI, and work engagement of nurse leaders (N = 800).

TABLE 3: Goodness-of-fit indices for path analysis models for the relationships of OE, MR, MI, and work outcomes.

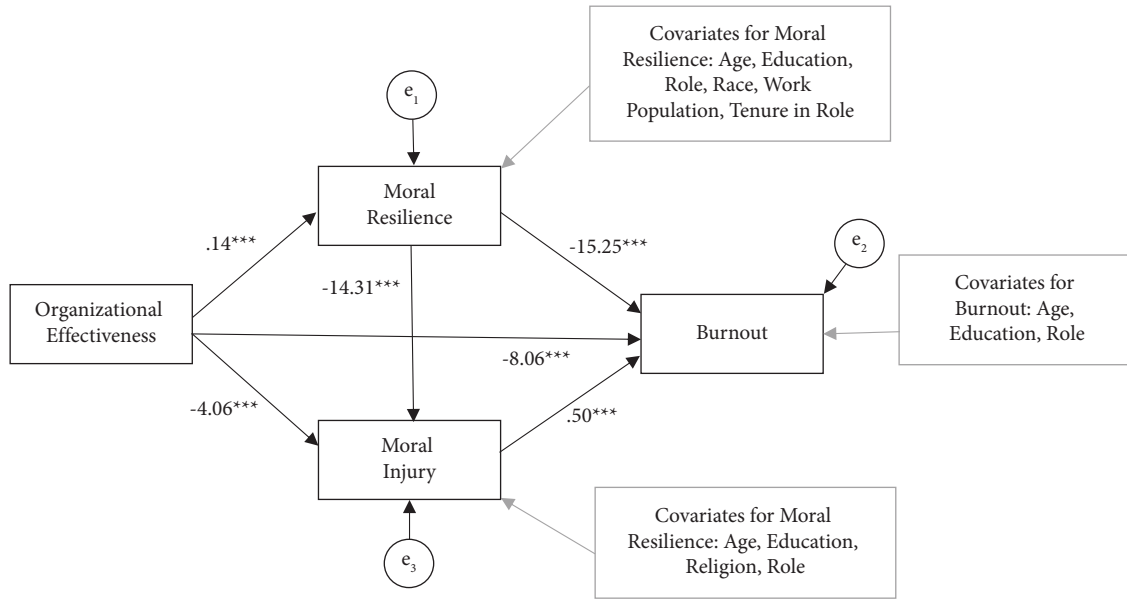
Fit indices	Model for work engagement (N = 800)	Model for burnout (N = 800)	Model for turnover intention (N = 799)
Chi-square (df), <i>p</i> value	37.04 (28), 0.118	39.10 (30), 0.123	36.30 (32), 0.275
RMSEA	0.02	0.02	0.01
<i>p</i> -close	1.000	1.000	1.000
CFI	0.99	0.99	0.99
TLI	0.98	0.98	0.99

TABLE 4: Coefficients, standard errors, and *p* values for path analysis models for the relationships of OE, MR, MI, and work engagement (N = 800).

	Coefficient	SE	<i>p</i>	Effect sizes for indirect effects	
Moral resilience					
Organizational effectiveness	0.13	0.01	<0.001		
Moral injury					
Moral resilience	-14.46	0.96	<0.001		
Organizational effectiveness	-4.03	0.39	<0.001		
Work engagement					
Moral resilience	0.37	0.08	<0.001		
Moral injury	-0.01	0.003	<0.001		
Organizational effectiveness	0.32	0.03	<0.001		
Mediation effects	Indirect effect coefficient (Monte Carlo)	SE	<i>p</i>	RIT	RID
OE -> MR -> work engagement	0.05	0.01	<0.001	0.14	0.16
OE -> MI -> work engagement	0.04	0.01	<0.001	0.12	0.13
OE -> MR -> MI	-1.95	0.23	<0.001	0.33	0.48

covariates included for each outcome variable in the model are listed in Figure 3. All goodness-of-fit indices indicate a good fit for the overall model (Table 3). All main direct

paths in the model were statistically significant (Table 5). The following is a summary of the hypothesized mediation effects.



Indirect mediation effects:
 OE -> MR -> Burnout, Coeff = -2.05, p = <.001
 OE -> MI -> Burnout, Coeff = -2.04, p = <.001
 OE -> MR -> MI, Coeff = -7.18, p < .001

FIGURE 3: Path analysis of the relationship among OE, MR, MI, and burnout of nurse leaders (N = 800).

TABLE 5: Coefficients, standard errors, and p values for path analysis models for the relationships of OE, MR, MI, and burnout (N = 800).

	Coefficient	SE	p	Effect sizes for indirect effects	
Moral resilience					
Organizational effectiveness	0.14	0.01	<0.001		
Moral injury					
Moral resilience	-14.31	0.96	<0.001		
Organizational effectiveness	-4.06	0.39	<0.001		
Burnout					
Moral resilience	-15.25	2.65	<0.001		
Moral injury	0.50	0.09	<0.001		
Organizational effectiveness	-8.06	1.01	<0.001		
Mediation effects	Indirect effect coefficient (Monte Carlo)	SE	p	RIT	RID
OE -> MR -> burnout	-2.05	0.40	<0.001	0.20	0.26
OE -> MI -> burnout	-2.04	0.40	<0.001	0.20	0.25
OE -> MR -> MI	-7.18	1.32	<0.001	0.32	0.47

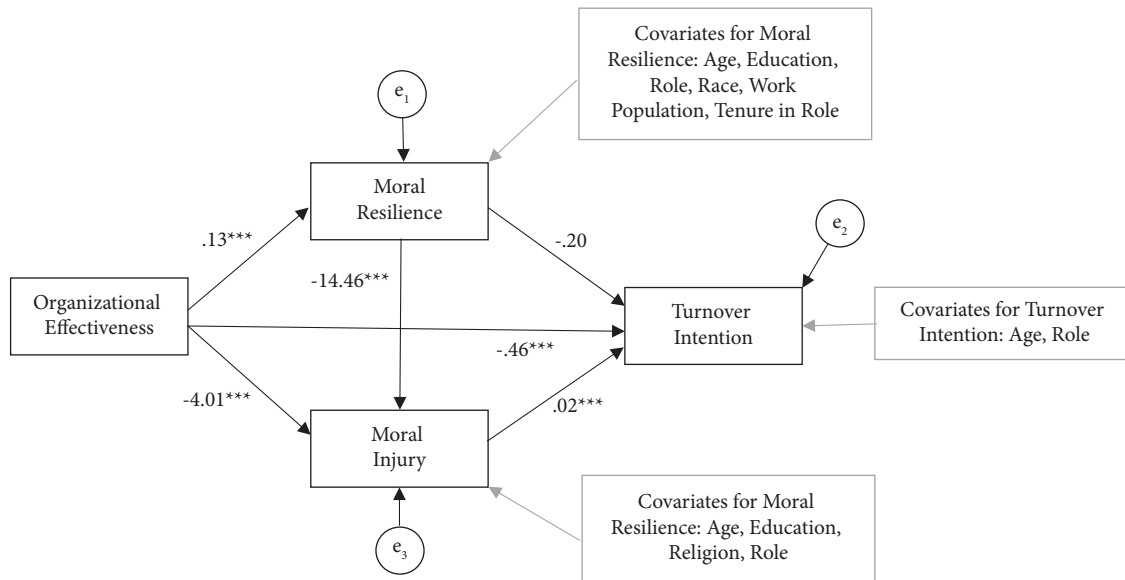
We examined whether MR mediated the relationship between OE and burnout controlling for the other predictors in the model. The indirect or mediating effect was statistically significant, $coeff = -2.05$, $se = 0.40$, and $p < 0.001$. The RIT effect size indicates that 20% of the effect of OE on engagement is mediated by moral resilience.

We examined whether MI mediated the relationship between OE and burnout controlling for the other predictors in the model. The indirect or mediating effect was statistically significant, $coeff = -2.04$, $se = 0.40$, and $p < 0.001$. The RIT effect size indicates that about 20% of the effect of OE on engagement is mediated by MI.

We examined whether MR mediated the relationship between MI and burnout controlling for the other predictors in the model. The indirect or mediating effect was

statistically significant, $coeff = -7.18$, $se = 1.32$, and $p < 0.001$. According to the RIT effect size, 32% of the effect of OE on MI is mediated by MR.

3.3.4. C: Path Analysis for Turnover Intention. Finally, SEM was used to simultaneously test our three competing mediation hypotheses for turnover intention: 1) OE->MR->turnover intention; 2) OE->MI->turnover intention; and 3) MR->MI->turnover intention. The covariates included for each outcome variable in the model are listed in Figure 4. All goodness-of-fit indices indicate a good fit for the overall model (Table 3). All main direct paths in the model, except for moral resilience to turnover intention, were statistically significant (Table 6). The following is a summary of the hypothesized mediation effects.



Indirect mediation effects:
 OE -> MR -> Turnover Intention, Coeff = -.03, p = .130
 OE -> MI -> Turnover Intention, Coeff = -.09, p < .001
 OE -> MR -> MI, Coeff = -.33, p < .001.

FIGURE 4: Path analysis of the relationship among OE, MR, MI, and turnover intention of nurse leaders (N= 799).

TABLE 6: Coefficients, standard errors, and p values for path analysis models for the relationships of OE, MR, MI, and turnover intention (N= 799).

	Coefficient	SE	p		
Moral resilience					
Organizational effectiveness	0.14	0.01	<0.001		
Moral injury					
Moral resilience	-14.46	0.96	<0.001		
Organizational effectiveness	-4.01	0.39	<0.001		
Turnover intention					
Moral resilience	-0.20	0.13	0.121		
Moral injury	0.02	0.004	<0.001		
Organizational effectiveness	-0.46	0.05	<0.001		
Mediation effects	Indirect effect coefficient (Monte Carlo)	SE	p	Effect sizes for indirect effects	
OE -> MR -> turnover intention	-0.03	0.02	0.130	RIT	RID
OE -> MI -> turnover intention	-0.09	0.02	<0.001	0.06	0.06
OE -> MR -> MI	-0.33	0.07	<0.001	0.17	0.20
				0.62	1.66

We examined whether MR mediated the relationship between OE and turnover intention controlling for the other predictors in the model. The indirect or mediating effect was not statistically significant, $coeff = -0.03$, $se = 0.02$, and $p = 0.130$.

We examined whether MI mediated the relationship between OE and turnover intention controlling for the other predictors in the model. The indirect or mediating effect was statistically significant, $coeff = -0.09$, $se = 0.02$, and $p < 0.001$. The RIT effect size indicates that about 20% of the effect of OE on engagement is mediated by MI.

We examined whether MR mediated the relationship between MI and turnover intention controlling for the other predictors in the model. The indirect or mediating effect was

statistically significant, $coeff = -0.33$, $se = 0.07$, and $p < 0.001$. According to the RIT effect size, 62% of the effect of OE on MI is mediated by MR.

4. Discussion

The goal of this study was to explore the relationship between OE and work outcomes, such as engagement, burnout, and turnover intention among U.S. nurse leaders, considering MI and MR in hypothesized pathways. We found that all facets of OE significantly contributed to MR and MI, as demonstrated by medium/large effect sizes, indicating a strong link between OE and nurse leaders' moral

wellness (MI and MR). These findings parallel those of a previous study with frontline nurses, which found 9 of the 10 facets of OE significantly contributed to both MI and MR [16]. Nurse leaders, particularly during a crisis, must prioritize staff wellbeing while also meeting regulatory mandates, financial objectives, and other organizational priorities to remain competitive in their professional environments. The inability to advocate for staff needs due to organizational change erodes leaders' integrity and their ability to navigate workplace challenges [38]. This is consistent with other studies that suggest that OE is predictive of MI symptoms and can be modified to reduce the detrimental impact [16, 19]. As noted in our previously published qualitative work, nurse leaders used open-ended survey questions as an opportunity to describe OE and its impact on ethical decision-making, which are referenced below to provide supporting context for key findings.

The facet of OE most strongly correlated with nurse leaders' MR was having protocols for addressing staffing needs when current staff have fulfilled their assignments. During the COVID-19 pandemic, shortages of nurses and other healthcare workers created difficult ethical challenges related to the allocation of scarce human resources. When filling staffing gaps, a common practice is to ask those already working to work overtime, which creates tension between leaders and staff who feel overworked. In the open-ended questions, leaders described this dilemma, *"middle-level management was drug through the mud during the pandemic. We received the pressures from both above and from our staff, and nothing was ever enough"* (Clinical Staff Leader). When healthcare organizations have clear protocols to avoid this conflict, MR is amplified; when protocols are absent, MR can be eroded, particularly when resources are constrained by a public health crisis. Another leader expanded on the lack of guidance and support in making ethical decisions, *"there is little support to make one feel confident in making decisions and the fear of getting in trouble is always looming over my head. Little guidance given, never any clear guidelines but always judged after the fact"* (Nurse Manager). These sentiments align with organizations like AONL, who are advocating for greater investment in nursing administration research to strengthen the provision of clear protocols and guidance for nurse leaders to utilize within their institutions [39]. Likewise, using an ethical framework for human resources allocation can make explicit the ethical tradeoffs that are necessary and illuminate the rationale for them [40].

Nurse leaders felt excluded from organizational decisions regarding staffing during the COVID-19 pandemic, which contributed to feelings of disempowerment and distress. Open-ended comments, such as *"directions come from above that are polar opposite of what I have voiced, and my teams are feeling. This adds to additional challenges and stress"* (Clinical Director), illustrated this concern. Executive leaders responsible for OE and outcomes may have adopted a "command and control" response rather than a collaborative, inclusive process for decision-making that equitably included nurse leaders. When nurse leaders are excluded from decision-making or their expertise and feedback are

seemingly disregarded, trust is inherently broken [4, 41]. From this research, we posit that when nurse leaders are involved with staffing and nursing care delivery decisions (especially during a pandemic), and when there are clear and transparent protocols for addressing surges in care, their moral efficacy, response to moral adversity, relational integrity, and self-stewardship are amplified. When nurse leaders are properly resourced and engaged in decision-making, their ethical commitments and wellness are maximized and trust is fostered. As a matter of justice and fairness, asking people who are already depleted to fill staffing gaps creates threats to relational integrity with their team and their ability to live their core values, such as respect for persons, fairness, and equity. Having protocols and processes that honor employee boundaries and commitments without coercion or retribution, especially during a public health crisis, can potentially relieve the moral suffering of both nurse leaders and frontline nurses [13].

Trust has consistently been identified as a key factor in mitigating the negative impact(s) of ineffective work environments on nurses. A qualitative analysis by Nelson et al. [4] yielded evidence, which supports the need for organizational infrastructure and supports from leaders to rebuild broken trust in the workplace. They offered the following five key remedies for rebuilding trust: (1) counseling/emotional support; (2) peer-to-peer support; (3) education and ethical support; (4) wellness offerings; and (5) spiritual/faith support. Given the nature of MI, rebuilding organizational trust may be an important element in restoring integrity and sustaining the nursing workforce, especially in the aftermath of a pandemic [42]. Models such as the Reina 3 Cs for trust building offer leaders a roadmap for identifying where trust is being built and broken and specific behaviors that are needed to sustain or rebuild it when it is broken [41].

The facets of OE that were most strongly associated with MI included the following: a) a lack of forums with other leaders to share concerns; b) an environment that prohibits voicing concerns for fear of retaliation; and c) the absence of pathways for requesting ethics consultation or advice. Taken together, these items suggest that nurse leaders' MI is decreased when there are strong and safe paths of communication within the leadership structure where they can share ethical concerns and obtain support for ethical decision-making from peers and experts. When nurse leaders lack psychologically safe space to share concerns, trust can erode, and MI symptoms may ensue. Although nurse leaders are outspoken advocates for patients and staff, their expertise is undervalued and nursing voices are often silenced, *"they (organizational leaders) don't want to hear criticism and you can't fix problems if all you hear is silence. Nurse leaders should not just hold a seat at the table, they should feel free to express ideas and concerns"* (Clinical Educator). In contrast, leaders who had a voice and contributed to decision-making felt supported and prepared for the ethical challenges brought by the pandemic. *"I truly believe that our organization has all of the disciplines at the table when making decisions and we were prepared to continue to lead through a crisis with strong integrity and professionalism"* (Clinical Director). These

findings suggest that innovative, trustworthy structures, and processes are required to create the conditions for nurse leaders to be heard, understood, and their expertise valued.

Lack of access to ethics consultation or advice has the potential to intensify MI symptoms, especially when nurse leaders are grappling with complex and uncertain ethical questions for which there are no easy answers [43]. During the COVID-19 pandemic, ethical issues were no longer episodic but rather imbedded in everyday reality. Lacking skills or processes to systematically address these issues via dialogue with others likely resulted in the accumulation of moral residue [44]. Over time, unresolved ethical issues can contribute to feelings of moral ineffectiveness, moral suffering including symptoms of MI, and compromised integrity. Whitehead et al. [45] found that moral distress was negatively correlated with ethical workplace climate among a sample of 592 clinicians. The highest sources of moral distress were watching patient care suffer due to lack of continuity and poor communication among care team members [45]. Strengthening access to ethics consultants, creating proactive mechanisms to identify ethical concerns, and fortifying ethics education for nurse leaders may help mitigate these types of negative consequences. Doing so may also strengthen the relational integrity of the entire team [24, 44].

Both MR and MI were mechanisms through which OE was associated with work engagement and burnout. Higher levels of OE were associated with greater MR and less MI, which was in turn related to better work engagement and less burnout. Previous research has demonstrated that OE is inversely related to MI [24]. The inverse relationship between MR and burnout has also been confirmed in other kinds of research [10]. In addition, an intervention to increase elements of MR was related to increases in work engagement [30]. This research builds upon the previous research outlined by examining a more integrated model of how these constructs are related to one another. This suggests there are several intervention points that are likely to amplify the impact on outcomes, such as work engagement and burnout.

When considering both MR and MI as mechanisms through which OE impacts turnover intention, MI was a more important mediator of OE on turnover intention. Previous research has found an inverse relationship between MR and turnover intention [10]; however, constructs were not previously examined in a larger statistical model with OE. One nurse manager described an organizational culture of blame and its impact on their mental and moral wellness and ultimately their decision to leave. *“The organization I left was unforgiving. The (leadership) was very into blame, ‘fix it’ and unsupportive. I was rung out. I had nothing left. It was horrible to leave the wonderful team I had worked so closely with through the pandemic, but I had to leave that hospital... or mentally implode”* (Nurse Manager). These types of cases may cause leaders to seek a position elsewhere, regardless of their MR, where they may be better supported to make decisions in alignment with their values. The exodus of nurse leaders postpandemic has led to a concerning trend that further threatens the sustainability of the U.S. nursing workforce [42].

In addition, when organizations were more effective, nurse leaders reported greater MR, and this mechanism was associated with lower MI. Thus, some of the effects of MR on work outcomes are indirect through its relationship with MI. Specifically, greater OE is associated with greater MR and lower MI, which is thereby related to higher work engagement, less burnout, and lower turnover intention. This is consistent with other findings that demonstrate the role of MR as a protective resource to decrease the detrimental impact of OE in key areas [10]. This does not imply amplifying workers’ tolerance for unethical situations but to restoring their moral efficacy to choose what is in alignment with their values and commitment to acting in integrity-preserving ways. As such, in cases where perceived OE is low, MR tends to be lower and may contribute to higher turnover intention. Our previous work also found that greater MR was associated with lower MI [24]; however, this study expands on those findings by how MR may mediate the relationship between OE and MI.

4.1. Limitations. This study did have limitations that should be considered when considering interpretation and generalization of the results. This was a convenience sample; thus, respondents may have been those who were particularly interested in OE and wellbeing during the pandemic. That said, recruiting via AONL, a national organization, and encouraging participants to share the initiation with others did result in representation from all 50 U.S. states. This, in addition to the large sample size, makes it likely that the sample is reasonably representative of nurse leaders in the United States. Whether these findings are relevant in other countries is beyond the scope of this study but warrants further investigation. The study was cross-sectional in nature; therefore, we could not establish the time-order relationships of mediational relationships. For that reason, we have done our best to ground the proposed paths in prior research and theory. In addition, all data were self-reported and, thus, relationships may be inflated due to common method variance.

5. Conclusion

Nurse leaders are experiencing MI symptoms related to OE. Healthcare organizations must focus on dismantling institutional structures and processes that negatively impact the moral wellbeing of leaders. MR and MI are both important pathways through which OE impacts workplace engagement and burnout. In other words, OE is related to increased MR and decreased MI, which may influence greater work engagement and less burnout among nurse leaders. However, to achieve these more favorable outcomes, nurse leaders’ moral suffering must be given sustained attention. Promoting a work environment that enables voicing concerns without fear of retaliation is a critical starting point for fostering respect and trust needed to ultimately retain nurse leaders in their positions. Future research should strive to understand the dynamic interplay of investments needed to create healthier work environments for both nurse leaders and frontline nurses collectively [46, 47].

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Review Article

Perioperative Nursing Shortages: An Integrative Review of Their Impact, Causal Factors, and Mitigation Strategies

Ada Xie ¹, Jed Duff ^{2,3} and Judy Munday ^{1,4}

¹School of Nursing, Queensland University of Technology, Brisbane, QLD, Australia

²School of Nursing, Centre for Healthcare Transformation, Queensland University of Technology, Brisbane, QLD, Australia

³Royal Brisbane and Women's Hospital, Centre for Nursing and Midwifery Research, Herston, QLD, Australia

⁴School of Health, University of the Sunshine Coast, Sunshine Coast, QLD, Australia

Correspondence should be addressed to Ada Xie; ada.xie@hdr.qut.edu.au

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Aim. This study aims to explore contributing factors, impacts, and strategies to address perioperative nursing shortages. **Background.** Health facilities worldwide are experiencing nursing shortages, especially in specialty fields such as perioperative nursing. **Evaluation.** This integrative review is reported according to the PRISMA guidelines. The title, abstract, and full article screening, as well as the quality appraisal process, were performed by two independent reviewers, with a third for disagreement. This review focused on empirical and theoretical research published from 2013 to 2023 using databases including CINAHL, Embase, Emtree (via OVID), Medline (via EBSCOhost), Scopus, Web of Science, ProQuest Dissertations and Theses Global, Overton, and GreyNet. **Key Issues.** This study thoroughly reviewed 84 articles. The perioperative domain confronts significant staffing challenges due to increased demand, lack of experienced nurses, insufficient new entrants, high turnover, and an aging workforce. Notably significant are the deficiencies in recruiting new nurses and the elevated turnover levels, potentially amendable issues. The shortages negatively impact the remaining nurses, patient care quality, and hospital revenue. Strategies to address perioperative nursing workforce challenges include promoting the specialty to undergraduate nursing students, bolstering recruitment efforts, and retaining experienced perioperative nurses. However, none of the studies examined in this review adopted a comprehensive approach. Furthermore, the effectiveness of these strategies relative to one another remains uncertain due to a lack of reliable measurements. **Conclusion.** Perioperative nursing faces considerable challenges, including an aging workforce, limited new recruits, and high turnover rates. Present strategies primarily prioritise workforce preparation over supporting current staff. Mitigating the perioperative nursing shortages requires comprehensive approaches integrating preparation, recruitment, retention, and retirement plans. In addition, these strategies must be adapted to the diverse regulatory environments of different countries, recognising the absence of a one-size-fits-all solution to perioperative nursing shortages globally. **Implication for Nursing Management.** Perioperative nursing managers are vital in reducing shortages.

1. Background

Nursing shortages are a severe global problem [1–4]. Worldwide, the World Health Organisation (WHO) report estimated a shortage of 5.7 million nurses by 2030 [5]. The shortage is most acute in the poorest nations, particularly in sub-Saharan Africa, where the shortage is exacerbated by substantial migration from poorer to wealthier countries, driven by salary gaps and recruitment initiatives in developed nations [6, 7]. High nurse turnover and problems

with retention compound nursing workforce shortages [2, 8–13]. In the United Kingdom (UK), the Nursing and Midwifery Council reported that 27% more nurses are leaving the profession than joining [2]. Worldwide, studies report turnover rates from 12% to 44.3% [10, 13, 14] and intention-to-leave rates from 42.9% to 94% [15–17]. An aging population also contributes to nursing shortages [1, 18–22]. Reportedly, 25%–55% of the nursing population in Australia and the United States (US) are 50 years and above [21, 23, 24]. Globally, the WHO has reported that, as

of 2020, 17% of the 27.9 million nursing workforce is 55 years or older, indicating that they are expected to retire by 2030 [5]. Associated with the aging process, the growing prevalence of chronic diseases necessitates more preventative and complex surgical interventions, increasing the demand for perioperative nurses [25, 26].

The perioperative nursing sector faces recruitment challenges due to its historical background, regulatory frameworks across various nations, and distinctive characteristics. Despite being the first recognised nursing specialty in the late nineteenth century [27, 28], it has been suggested that perioperative nurses often struggle to assert their role, facing perceptions of being mere assistants to surgeons [29, 30]. Moreover, in some countries such as Spain and Turkey, perioperative nursing still lacks official recognition [31, 32]. Regulations in certain countries also pose barriers to entering the perioperative nursing specialty. While specialty nurses can be employed at different levels in Sweden and Greece [31] and nurses with experience in the intervention fields can practice in those areas in Portugal and Finland [31, 33], specialised postgraduate training is required for perioperative nurses before employment in countries such as Norway, Belgium, Lithuania, Netherlands, Poland, Slovenia, Germany, Switzerland, Brazil, China, Japan, and Canada [27, 31, 34–40]. In countries such as Spain and Turkey, highly centralised policy restricts the free-flowing labour market [31, 41]. The demanding nature of perioperative nursing may further deter potential recruits. Perioperative nursing is unique due to its rapid pace, involvement in complex procedures, reliance on advanced technical equipment, and quick patient turnover [4, 29, 42, 43]. Amidst the commitment to patient safety in a fast-paced and intricate setting [44, 45], perioperative nurses often face numerous hazards, including noise [46], chemicals, radiation, waste anaesthetic gases, disinfectants, surgical smoke, sharp objects, and bloodborne pathogens [44, 47, 48]. Moreover, stressors such as night shift demands, unforeseeable events, excessive workloads, and insufficient resources can lead to burnout among perioperative nurses [49]. The need for specialised skills and extensive orientation periods add to the complexity and costliness of training in perioperative nursing. Perioperative nurses require specialised critical care skills [50–52]. In addition to fundamental theoretical knowledge, they must possess advanced technical and cognitive abilities, such as anticipating patient needs, adapting to evolving situations, and efficiently handling unexpected events [53]. Therefore, it usually takes six to twelve months of orientation for new nurses to attain proficiency in their perioperative nursing roles [54, 55]. The extensiveness and length of training time make perioperative nursing one of the costliest specialties to train [22, 56]. The expense of training a perioperative nurse is believed to exceed that of general nursing, which can cost up to \$88,000 per nurse [12, 57].

Within healthcare settings, nursing shortages can compromise the whole healthcare system. A shortage of nurses in a department leads to heightened workload and stress levels among the remaining nurses, leading to emotional exhaustion, burnout, and job dissatisfaction,

ultimately impacting the quality of nursing care [7, 58, 59]. In the general nursing area, reviews have suggested a significant correlation between inadequate staffing levels and adverse patient outcomes [60, 61]. In the perioperative setting, research by Lee et al. [4] highlights a close relationship between nursing shortages and reduced quality of patient care. For example, an observational study carried out in postanesthesia care units in Greece found that the incidence of hypoxaemia was significantly higher in understaffed units [62]. Nursing shortages can cause notable workforce instability, marked by higher turnover rates among nurses, leading to increased expenses associated with recruitment and training of replacements [7].

There has been abundant literature focusing on staffing shortages, primarily within the broader nursing field. A previous literature review by Ross [63] delved into factors contributing to nursing shortages and proposed solutions to mitigate them. Another systematic review pinpointed the following four primary contributors to nursing workforce shortages: policy and planning impediments, barriers to training and enrolment, causes of nursing staff turnover, and the stress and burnout experienced by nurses [58]. Regarding mitigating strategies to reduce nursing shortages, a systematic review by Park and Yu [64] evaluated the effectiveness of policies addressing nurse shortages. As examined in a systematic review by Mohamed and Al-Hmairat [7], nurse residency programs emerged as promising educational interventions for nurturing competent new nurses and enhancing retention rates. Regarding the perioperative setting, a literature review by Willemsen-McBride [52] revisited preceptorship and suggested ways to enhance existing orientation programs. However, as most reviews focus on the general nursing landscape, there is a notable gap in exploring the staffing issues in the perioperative setting. Given the complexities involved in maintaining adequate staffing levels in perioperative environments, an integrative review was conducted. This study aimed to systematically explore the negative impacts, causal factors, and potential solutions related to shortages in perioperative nursing personnel. The Human Resource for Health and Action Framework was employed to structure and synthesise the information gathered. This framework, endorsed by the WHO, provided a robust framework for organising insights on human factors in healthcare [65, 66].

1.1. Objective. This integrative review aimed to explore contributors to the international perioperative nursing shortage. Strategies and initiatives to address perioperative nursing shortages and the potential impacts of shortages in this setting were also investigated.

1.2. Review Question. The main review questions are as follows:

What are the contributing factors and impacts of the perioperative nursing shortage worldwide? What strategies are used to address the shortages in the perioperative nursing workforce?

Using the Population, Prognostic Factors, and Outcome framework [67], the elements of the questions are framed as follows.

1.2.1. Population. This study includes all perioperative nurses and undergraduate nursing students. Undergraduate nursing students were included to enhance understanding of how perioperative nurses are recruited into this specialty.

1.2.2. Prognostic factors. Factors contributing to the perioperative nursing workforce shortage.

1.3. Outcomes of Interest

- (1) Factors contributing to workforce levels: recruitment, retention, and turnover.
- (2) Impacts of workforce shortages: at the patient level—quality of patient care and patient safety; at the organisational level—hospital revenue; and at the staff level—work and life quality, work satisfaction, health issues, and burnout.
- (3) Strategies to address workforce shortages.

2. Methods

This review used an integrative approach to assimilate both empirical and theoretical research [68–70]. This review followed the five steps of an integrative review: problem identification, literature search, data evaluation, data analysis, and presentation [71]. The search was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [72].

2.1. Search Strategy. The search included the following databases: CINAHL, Embase, Emtree (via OVID), Medline (via EBSCOhost), Scopus, and Web of Science. Grey literature was sought via ProQuest Dissertations and Theses Global, Overton, and GreyNet. Key terms with MeSH headings included MH “perioperative nursing”, MH “operating room nursing”, MH “postanaesthesia nursing”, “surgical nurse”, “anaesthetic nurse”, (MH “recovery room”) AND (MH “nurses+”), “instrument nurse”, MH “personnel selection”, MH “personnel turnover”, “nurse recruitment”, “nurse retention”, “shortage of nurses”, “personnel staffing and scheduling+”, “nurse supply”, and “intention to leave”. Complete search strategies across all databases are provided in Supplementary File (available here) 1.

2.2. Inclusion and Exclusion Criteria. The search sought experimental and nonexperimental primary research studies of any design, policies, and reports published in English from January 2013 to June 2023. The inclusion criteria and excluding conditions for studies are outlined in Table 1.

2.3. Screening. The search process adhered to the flow diagram outlined in the PRISMA statement [72]. In the initial search phase, articles identified from targeted databases were

exported to EndNote. Following this, duplicate entries were removed from the imported search results. The data were then forwarded to Rayyan for comprehensive screening, covering titles, abstracts, and full articles. Two independent reviewers conducted title and abstract screening according to predefined inclusion and exclusion criteria. In instances of disagreement, a third reviewer was consulted to reach a consensus. Full-text screening followed a similar procedure, with two independent reviewers assessing the articles and a third resolving any discrepancies. In this round, the identified articles underwent screening of both abstracts and full articles by two reviewers, with a third reviewer consulted to ensure consensus was reached.

2.4. Data Extraction. A data extraction form was devised to gather key elements and details from the chosen articles, which was piloted before implementation. This form encompassed categories such as “Author/Date/Country”, “Sample/Population”, “Study Method/Theoretical Framework”, “Contributing Factors and Negative Impacts of Shortages”, and “Strategies to Mitigate Shortages”. The primary reviewer extracted relevant data from the articles based on the predefined categories and entered it into the corresponding columns. The extraction process differed based on study type: themes identified from qualitative studies and reports were extracted, whereas descriptive data information was extracted from quantitative studies. The second reviewer examined the extracted data to confirm consensus.

2.5. Quality Appraisal. The Quality Appraisal for Diverse Studies (QuADS) tool was used to appraise the included 58 primary research articles due to its applicability for multi or mixed-methods design [73, 74]. The QuADS tool contains a checklist of 13 items with answers rated from 0 (lowest quality) to 3 (highest quality). Although the tool does not allow ranking the quality of studies as low, moderate, or high, the percentage of the maximum achievable score may indicate the quality of the appraised studies [73]. Two reviewers conducted appraisals independently, and disagreements were resolved through discussion. One reviewer was an author of an included article [75] and was purposefully not assigned to appraise this study.

Two viewers independently used the Quality Improvement Minimum Quality Criteria Set (QI-MQCS) [76] to evaluate the quality of the 26 quality improvement articles, with a third reviewer to resolve disagreements. Questions answered “met” scored “1” [76]. The total score of each article was added up, and a percentage based on a total mark of 16 was calculated.

2.6. Data Synthesis. The synthesis of data was meticulously structured and organised in alignment with the Human Resource for Health and Action Framework, a comprehensive model designed to foster the sustainability of the workforce by devising strategies to address critical workforce challenges such as inequitable staff distribution, insufficient

TABLE 1: Eligibility criteria.

	Included	Excluded
PFO	(i) Instrument/circulating nurses (ii) Anaesthetic nurses/Nurse anaesthetists (iii) Postanaesthetic care unit nurses (iv) Perioperative nurses in management and education (v) Nurse surgical assistants (vi) Perioperative nurse practitioners (vii) Perioperative ancillary nurses (viii) Undergraduate nursing students involved in perioperative nursing programs	(i) Retired perioperative nurses (ii) Nurses working in other specialties
Prognostic factors	Factors contributing to shortages in perioperative nursing	(i) Pandemic issues (ii) Natural disasters (e.g., fire) (iii) War, unstable political national environment (iv) Non work-related personal issues
Outcomes	(i) Workforce levels: recruitment, retention, turnover (ii) Impacts of workforce shortages: patient level-quality of nursing care and patient safety, organisational level-hospital revenue, staff level-burnout, work and life quality, job satisfaction, health issues, etc. (iii) Strategies to address workforce shortages	(i) Critical condition of the patients (ii) Hospital revenue loss by other factors

skills and knowledge, elevated turnover rates, and diminished motivation [65, 66]. This framework serves as a guiding platform in navigating the complex terrain of workforce management within the perioperative nursing domain. The findings of the study were methodically condensed and categorised according to the three fundamental components of the framework: entry, current workforce, and exit, as illustrated in Figure 1. Each component represents a distinct phase in the lifecycle of the workforce, encompassing recruitment and onboarding processes, the ongoing management and development of the existing workforce, and the transition and departure of staff from the workforce [65, 66]. This systematic synthesis provides a structured approach to understanding the multifaceted challenges and opportunities within perioperative nursing workforce dynamics, thereby facilitating the development of effective interventions and strategies to address these complexities.

3. Results

This review encompassed 84 articles, as illustrated in Figure 2 of the PRISMA flowchart [72]. Most articles included in this review were conducted in the US (56/84, 67%). The remainder was conducted in Sweden (7/84, 8%), Australia (5/84, 6%), Canada (3/84, 4%), Iran (3/84, 4%), Turkey (2/84, 2%), and only one study (1% each) from the following: China, Finland, Ghana, Greece, Iceland, Norway, South Korea, and Spain. Most articles (58/84, 69%) comprise primary research using descriptive or observational designs, such as cross-sectional correlational surveys. The remaining 26 articles are quality improvement reports (26/84, 31%), primarily based in the US. The characteristics of the included 84 articles are included in the Study Characteristics Table (Supplementary File 2).

The critical appraisal results of the selected articles are presented in Supplementary File 3. The QuADS appraisal (part 1) reveals that 13 primary research articles (13/58, 22%) scored above 80% of the maximum score (39), 18 articles (18/58, 31%) scored between 60% and 79%, and the remaining 27 articles (27/58, 47%) scored below 60%. Appraisal of the 26 quality improvement reports using the QI-MQCS tool (part 2) resulted in 6 articles (6/26, 23%) scoring within 80–100% of the maximum score (16), 11 articles (11/26, 42%) scoring 60–79%, and 9 scoring below 60%. Although most of these reports scored higher than 60% (17/26, 65%), essential aspects of quality improvement reports such as study design, comparators, data source, adherence, and health outcomes are missed, which impacts the completeness of these reports [76, 77].

3.1. Shortage Levels. Limited information regarding the extent of shortages was observed in the selected articles. In the US, the Association of periOperative Registered Nurses (AORN) conducts annual surveys to examine compensation disparities, job satisfaction levels, potential turnover rates, and factors contributing to perioperative nurses' intentions to leave their positions [8, 78–85]. Notably, the ten AORN

survey reports are the sole studies among the selected articles that provided data on vacancies. Over the ten years from 2013 to 2023, the surveys reported that the vacant percentage of full-time perioperative nursing positions rose from 3.1% to 18%, and the percentage of managers who claimed a moderate to crisis level of nursing shortages ranged from 37% to 73% [8, 78–85]. Conversely, we found a lack of data concerning perioperative nursing shortages in other countries.

3.2. Impacts of Perioperative Nursing Shortages. This review identified nursing shortages in the perioperative setting as an impact on the quality of patient care, nurse satisfaction, and health service revenue. Quality of patient care is generally affected by negative impacts on the remaining nurses due to understaffing, such as fatigue and burnout, which can lead to reduced job involvement and increased errors that harm patients [86]. A Turkish correlational study found that work-related stress may negatively impact safety attitudes by 20.2% [50]. An observational study of 2207 participants in Greece reported that the incidence of adverse events among patients was significantly higher and of higher severity in highly understaffed versus sufficiently staffed departments [62]. Another US survey covering 1693 perioperative nurses discovered that inadequate staffing in the perioperative settings caused missed care due to miscommunication and lack of preparation [87]. Some studies considered the financial impact of perioperative nursing shortages. In some hospitals, perioperative departments generate substantial revenue [88]. Financial loss is associated with delaying or cancelled surgeries due to a lack of nursing staff, as reported by the AORN surveys [8, 83–85], and the high turnover cost of US\$65,000–\$120,000 for a perioperative nurse, according to a US quality improvement report [89].

3.3. Contributing Factors and Mitigating Strategies to Perioperative Nursing Shortages. In alignment with the Human Resources for Health and Action Framework [65, 66], a comprehensive examination was conducted to discern the factors contributing to and potential strategies to alleviate perioperative nursing shortages. This evaluation was structured around the framework's three pivotal phases: entry, current workforce, and exit. Each phase was meticulously scrutinised to identify primary themes indicative of the challenges and opportunities within perioperative nursing. The synthesis of these themes is presented in detail in Table 2, providing a comprehensive overview of the landscape surrounding perioperative nursing shortages and potential avenues for intervention.

3.3.1. Entry (Workforce Preparation). Workforce preparation encompasses strategic planning aligned with market needs, acquiring knowledge and skills through education and recruiting individuals into specialised roles within the field [65, 66]. This review revealed an imbalance between the demand for and the supply of



FIGURE 1: Human Resource for Health and Action Framework. Adapted from the human resource for health and action framework [65, 66].

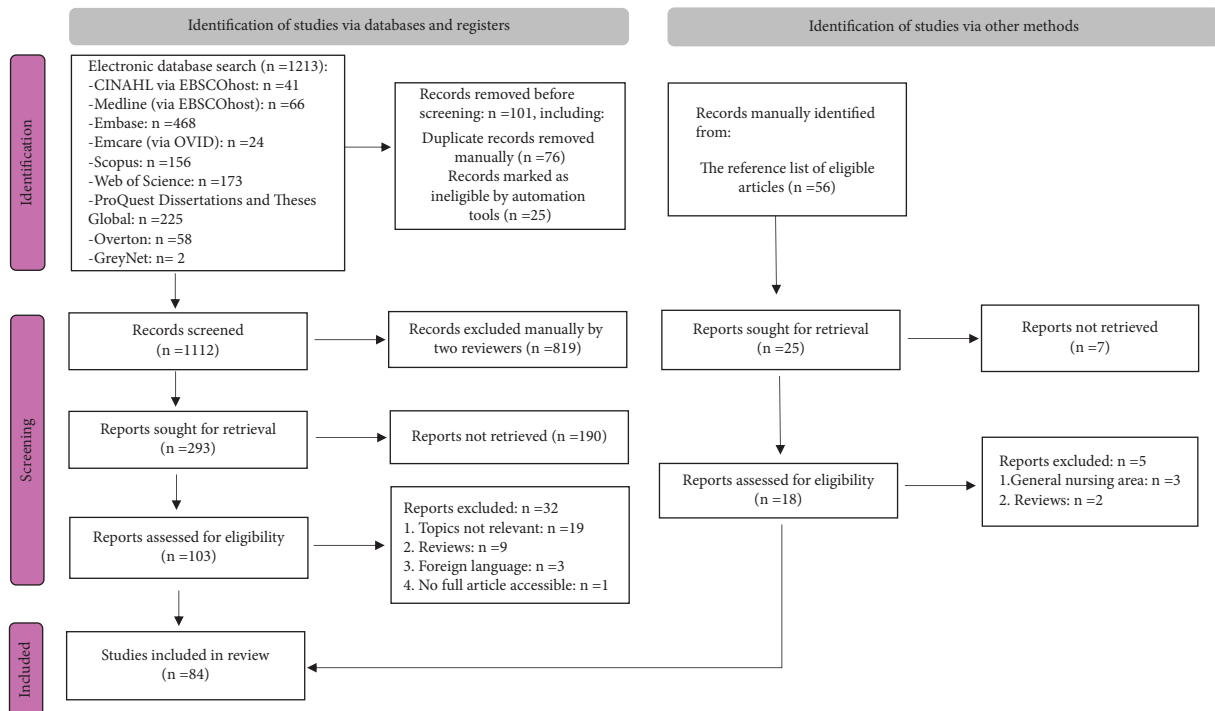


FIGURE 2: PRISMA flowchart [72].

perioperative nurses. The evidence indicates an increasing demand for perioperative nursing professionals. Almost 50% of the respondents to the AORN surveys in the US between 2013 and 2023 claimed increasing surgical activity in their facilities [8, 78–85]. Studies in the US [20, 85, 90, 91] and Spain [26] suggested that increasing demands for nurses are driven by an aging population requiring more frequent and intense surgical interventions. However, the availability of qualified perioperative nurses appears to be falling behind. The AORN surveys reported that only 3-4% of newly graduated nurses entered the perioperative setting annually [8, 78–85]. Likewise, additional studies included in the review found that the majority of nursing graduates opt for familiar nursing specialties, such as medical-surgical wards, instead of perioperative areas that were not generally offered during their undergraduate programs [12, 20, 22, 55, 56, 88–111].

The general practice of not recruiting newly graduated nurses into the perioperative specialty is another issue that further expands the gaps in meeting the demand. Particularly in the US, multiple quality improvement reports suggest a practice of not hiring new nursing graduates among perioperative nursing managers [43, 88, 92, 93, 105, 112–114]. Management’s concern about a general lack of experience or understanding of perioperative nursing among graduate nurses was reported [43]. Authors of a quality improvement report identified that allowing novice nurses to develop critical thinking skills in medical-surgical units also decreases the probability of nurses transferring to perioperative areas once they are fully adapted to medical-surgical specialty [88]. This review highlighted various initiatives to alleviate staffing shortages, primarily concentrating on preparing and recruiting perioperative personnel. In the US, recruiting experienced nurses from other specialties and providing them with perioperative orientation was a frequently used

TABLE 2: Summary of contributing factors and strategies to address the perioperative nursing shortages.

Entry (Workforce Preparation)	
Planning	(-) An aging population leads to increasing demand for perioperative nurses (-) General lack of experienced/qualified perioperative nurses
Education	(-) No perioperative nursing programs for undergraduate nursing students (-) Lack of placement spaces in hospitals (-) Lack of perioperative nursing faculty in universities (+) Universities increasing faculty and providing perioperative nursing electives/programs for undergraduate students (+) Perioperative nursing educational programs for novices with health service: academic partnerships
Recruitment	(-) Not recruiting newly graduated nurses (+) Active hiring of newly graduated nurses (+) Recruiting and training experienced nurses from other specialty
Current Workforce (Enhance Workforce Performance)	
Supervision	(+) Yearly surveys to monitor job satisfaction and intention to leave (e.g., AORN surveys)
Compensation	(-) Insufficient salary/rewards for the roles and training, and compensation/salary topped out for senior nurses (+) Appropriate salary matching job roles, recruitment incentives, and retention bonus
Lifelong learning	(-) Lack of continuous training and chances for professional development (+) Continuous training opportunities (+) Having access to career advancement opportunities (+) Empowerment, autonomy, delegation of leadership, and governance (+) Career planning and customised training (+) Competitive working environment
System support	(-) Working environment with hazards that could lead to physical or psychological damage to staff (-) Various issues with management that lead to job dissatisfaction among staff (-) Inconsistent guidelines and protocols (-) Inadequacy of precautions (-) Facility budget constraints (-) Staffing staff feel no connection to the facility (+) Organisation level: stability, secured job, and resolving organisational issues (+) Increasing planned funding and providing adequate resources (+) Managers sufficiently trained in their roles, providing strong support, reducing hazards, and promoting staff wellbeing in the department
Exit (Managing Attrition)	
Migration	No evidence was found in the selected articles
Career choice	(-) New job opportunities in other organisations that could expand the nurses' skills and knowledge (-) Leaving the healthcare profession
Health and safety	(-) Musculoskeletal disorders due to aging or physical demands of the job (-) Poor workplace-related mental wellbeing (+) Developing practices or positions that require less physical exertion (+) Wellness programs focusing on health promotion and lifestyle, as well as reducing hazards (+) Readily accessible newer technologies to reduce physical strain (+) fewer call hours, shorter shifts, and flexible scheduling (+) Establish organisational policies, professional standards, and guidelines to prevent psychosocial hazards
Retirement	(-) Mass retirement due to an aging workforce (+) Supportive leadership and health promotion programs to improve job satisfaction and preserve the ability to remain on the job

Note: “(-)” indicates contributing factors to perioperative nursing shortages; “(+)” indicates strategies to resolve nursing shortages.

strategy to fill vacancies in the perioperative section [8, 78–85, 93, 98, 101, 113, 115–117]. Furthermore, five reports highlighted that certain facilities enlist new nursing

graduates into the specialty through on-the-job training initiatives, such as perioperative nurse residency programs [43, 92, 93, 112, 113]. Also, a trend for universities to embed

perioperative nursing exposure programs for baccalaureate nursing students through health service-academic partnerships was evident [12, 20, 55, 56, 89–98, 100–112, 118]. One perioperative immersion program was designed for high school students [93].

Perioperative nursing programs successfully encouraged interest in entering the perioperative specialty and saved costs in orientation [22, 56, 88, 90, 91, 93–97, 100, 102–104]. It is reported that between 38%–100% of nursing students exposed to the perioperative setting entering the specialty after graduation [90, 94, 103, 105, 111, 113]. Specialty programs can help students make informed decisions about their career direction [106], with high retention rates (70%–100%) after two years recorded in four of the quality improvement reports [92, 93, 112, 119]. Studies from the US and Australia suggested that nursing students with perioperative exposure and guided learning can demonstrate practical skills in this specialty, with improved self-efficacy and confidence than those without [56, 88, 95, 96, 101]. The perioperative training and immersion programs also have benefits for hospital costs. Ten of the 26 quality improvement reports indicated that hospitals could save half of the costs in orienting a novice by employing newly graduated nurses with perioperative experience [56, 88, 93–96, 101, 103, 107].

3.3.2. Current Workforce (Workforce Performance). The articles examined in this study underscored that elevated nurse turnover significantly contributes to shortages within the perioperative nursing workforce. In the US, the AORN surveys reported that perioperative nursing turnover increased from 25% in 2016 to 59% in 2022; respondents who expressed intention to quit increased from 11% to 34% from 2013 to 2022 [8, 78–85]. Another study noted a consistent turnover of 12.8% to 13.6% between 2016 and 2017 [119]. In addition, a report indicated that approximately half of perioperative nurses exit the specialty within two to three years, often due to the extensive orientation requirements [88]. Intention to leave rates were reported as 20% in a Spanish study [26], 42.9% in an Iranian study [15], and deemed “high” in a South Korean study involving 193 perioperative nurses [120].

According to the Human Resource for Health and Action Framework, elevated turnover rates and leaving intentions are associated with supervision, compensation, system support, and learning opportunities within healthcare institutions [65, 66]. Constant supervision, such as implementing a routine monitoring process, can offer insights into the progress of key elements of human resource strategies [65, 120], but this beneficial practice has not been extensively adopted within healthcare systems. Besides the annual AORN survey [8, 78–85], other countries did not use similar benchmarking. Dissatisfaction with compensation is a contributing factor to perioperative nursing shortages. The ten AORN surveys identified that dissatisfaction with compensation increased from 17% to 52% from 2013 to 2022 [8, 78–85]. Salary was identified as a factor leading to the highest dissatisfaction among participants in two cross-sectional studies, one in Spain and one in the US [26, 121]. Dissatisfaction with compensation

was also evident in two other studies [122, 123]. Lack of professional development opportunities can also lead to staff leaving their current positions, as reported by a focused ethnography of perioperative nurses in the US [124]. In Iceland, a cross-sectional study revealed that nurses provided opportunities for further training and education in another department or organisation were more likely to consider leaving their current position [125]. The foremost issue causing staff dissatisfaction, intentions to leave, and turnover is the inadequate organisational or managerial support to mitigate the risks of physical and mental health damage to the perioperative nurses. According to 23 articles in this review, organisations failing to provide a safe working environment or culture for perioperative nursing staff is a common issue leading to nurse turnover worldwide [8, 49, 75, 78–85, 118, 120, 122–134]. Potential factors posing physical and mental health damage to perioperative nurses in the workplace include environmental hazards such as biological, chemical, and radiation exposures [134], continuous physical exertion [82], and intense work demands requiring constant mental focus [120]. In addition, the persistence of negative behaviours such as incivility and bullying remains a significant challenge in the perioperative settings [20, 75, 122]. These behaviours encompass various forms, such as verbal abuse [120] and depersonalisation [26], along with instances of exclusion and mistreatment by colleagues and management [122, 132]. Lack of support or recognition from management also contributes to staff attrition [8, 80, 82–85, 118, 122, 123, 125, 128, 133]. Failing to provide flexible working hours also contributes to staff turnover. An average of 17.3% of AORN survey respondents reported dissatisfaction with working hours [8, 80, 82–85]. While a cross-sectional study in the US claimed that flexible scheduling was available to only 39% of 2121 perianaesthesia nurses [133], participants in another US qualitative study described a lack of proper breaks during long working hours [123]. Other issues that lead to nurse turnover associated with the system include budget constraints [8, 80–85], short of resources [75], lack of consistent guidelines and protocols for clinical practices [131], nursing staff not feeling connected to the hospital [118], and nurses being socially detached [120, 135].

Multiple strategies were identified to reduce turnover among the current workforce. Three Swedish descriptive studies [122, 126, 136] and two US-based phenomenological studies [118, 128] suggested that well-functioning leadership is vital to the success of other workforce strategies. Two studies recommended the importance of a healthy and safe work environment to job satisfaction and wellbeing among perioperative nursing staff [26, 75]. The significance of teamwork in the perioperative working environment was supported by a qualitative study in Norway [137], a correlational study in the US [138], and a focused ethnography in Canada [124]. Furthermore, an Iranian correlational study of 350 perioperative nurses identified a close association between professional communication and professional commitment [139]. A Swedish qualitative study identified that nursing staff who are provided with sufficient opportunities for career

advancement have less intention to leave [136]. A high level of job satisfaction was reported in a cross-sectional study among perioperative nurses with higher certificate levels [121] and perioperative nurses who receive skill training [140]. In addition, the AORN surveys recommended the need for improvement in compensation [8,78–85]. Another correlational study stressed the importance of empowerment to staff retention [141]. Other suggested strategies to encourage retention include adequate staffing and resources [133], flexible hours, a supportive climate, and low-strain work to reduce health issues [135].

3.3.3. Exit (Attrition). Nurse attrition can be attributed to migration, retirement, health issues, or a change of career [65, 66]. This review found that mass retirement, health issues, and career changes lead to perioperative nursing attrition, but evidence of migration is not identified. Projected retirement among perioperative nurses is concerning. The retirement rate of perioperative nurses responding to the AORN surveys remained at an average rate of 34% between 2013 and 2023 [8, 80–85]. Another cross-sectional survey among 2121 perioperative nurses in the US found that a projected mass retirement (58%) was expected by 2020 [133]. A Spanish cross-sectional study identified that 20% of perioperative nurses will retire in 2024 [26, 118, 134, 142]. Health issues are also a critical factor for perioperative nurse attrition. Studies conducted in the US and Sweden identified that self-rated health and musculoskeletal disorders are associated with nurses leaving the profession [118, 126]. Change of career is another factor leading to nurse attrition. The ten AORN surveys identified perioperative nursing attrition due to new job opportunities or leaving the healthcare profession at a rate of 23.5% and 2%, respectively [8, 80–85]. A cross-sectional study in the US reported that nurses who can expand their skills and knowledge in other units or organisations are more likely to consider leaving their current position [125]. This review found limited evidence on strategies for managing attrition specifically. Participants in a phenomenological study targeting older nurses in the US reported fear of having to retire when their health deteriorates [118]. Strategies to help retention of older nurses include supportive leadership and health promotion programs to preserve their ability to remain on the job [118]. These strategies were also suggested in a Swedish qualitative study of 955 perioperative nurses [135].

3.3.4. Overall Impression of Recommended Strategies. The strategies outlined in the chosen articles primarily focus on single dimensions, with a few incorporating multiple dimensions. Nonetheless, none of the studies employ comprehensive mitigation strategies, and there is a lack of reliable measurement tools to determine which strategies are more effective than the others. Although some articles in the review suggest coordinated recruitment and retention strategies to address current perioperative nursing shortages [8, 78–85, 90, 91, 93, 98, 101, 113, 115–117, 143], these strategies were not evident in the selected articles.

4. Discussion

Perioperative nursing shortages have been, and will continue to be, a challenge for health services over many years. According to a cross-sectional study in the US, the perioperative workplace was the least favourable among eleven nursing work environments [144]. This finding may be attributed to the fact that perioperative nurses face a greater risk of physical and mental injuries compared to general ward nurses, given the nature of their work environment and job responsibilities [118, 134, 142]. Perioperative nurses are often exposed to multiple physical and psychological stressors [45, 145]. This environment is known for its high demands, stress, and pressure [50, 51], requiring intense focus, expert knowledge, and swift action related to surgical procedures and patient safety [120]. In this high-risk environment, perioperative professionals frequently encounter the dilemma of ensuring patient safety amidst the rapid pace and intricate nature of modern surgical procedures [29, 146]. Multidisciplinary bullying and lateral violence persist, contributing to moral distress and potential mental health issues among perioperative nurses [29, 122]. The ongoing prevalence of burnout and mental exhaustion among perioperative nurses can significantly diminish their resilience and elevate their intentions to leave their positions [45, 122].

The review findings point out key factors affecting the perioperative workforce, such as rising demand for nurses, limited recruitment into the specialty, high turnover, and retirements. Significantly, while the increasing demands on nurses and the aging workforce are unpreventable, limited recruitment and high turnover emerge as factors that can be modified. Staffing preparation appears to lag due to a lack of undergraduate programs offering perioperative nursing training. Since its inception, perioperative nursing training initially adhered to a doctor-centric, hospital-based approach [29, 52]. However, in the 1980s, many hospital-based diploma nursing programs were either closed or shifted to baccalaureate degree programs, resulting in the omission of perioperative nursing from the curriculum [20]. Many universities are also discouraged from building up the curriculum as perioperative specialty not being a prerequisite for registration, lack of faculty with perioperative experience [90], time constraints, and shortages of local placements [29, 92]. Academic-practice teams may face obstacles when starting an immersion program, such as getting support from administrators and preceptors, coordinating schedules, managing time constraints, and dealing with limited staff and resources [91]. Consequently, nursing students typically graduate with minimal or no exposure to perioperative nursing [29]. Lack of immersion in the perioperative nursing role, primarily involving observation without hands-on experience, was linked to a decrease in the number of graduate nurses seeking positions in the perioperative specialty [55]. The high nurse turnover and elevated intention-to-leave rate among the perioperative nursing workforce are significant concerns. Factors contributing to perioperative nursing workforce turnover, as identified in this review, appear to be environmental, cultural, and managerial, highlighting implications for the

wellbeing of perioperative nurses. It cannot be overstated that high-quality healthcare relies on healthcare practitioners' health, general wellbeing, and safety [147, 148]. Factors influencing the wellbeing of perioperative nurses include workplace culture, career development, work-life balance, and compensation [47, 142, 147]. However, a case study conducted in the UK declared that the wellbeing of the staff was either not a priority or not taken seriously by their employers [42]. The wellbeing crisis in health care has been identified as a key concern by many stakeholders [147–149]. The People Plan launched in both the US and the UK emphasised the importance of and proposed initiatives for looking after the health and wellbeing of healthcare employees [147, 150]. Psychological wellbeing is now a government priority in the workplace in Australia, with national standards and legislation established regarding workplace behaviours [151, 152]. A recent UK study with a three-round Delphi technique identified that actions to support the wellbeing of nurses should focus on the organisational level rather than public policy and research [147].

This review underscores the adverse effects of perioperative nursing shortages on existing staff, patient care quality, and organisational finances. These shortages contribute to staff fatigue and burnout, possibly lowering work engagement, escalating disruptive behaviours like incivility and bullying, and increasing the likelihood of errors jeopardising patient safety. In consequence, perioperative understaffing leads to further nursing turnover and subsequent financial loss in recruiting and training new staff [9]. Even the lowest rates (15–18%) of nursing workforce shortages disrupt hospital operations and increase hospital costs; a higher rate of nursing shortage may lead to substantial revenue loss and decreased quality of patient care for the healthcare system [10].

This review extensively explores strategies to alleviate the shortage of perioperative nurses. However, these strategies are mainly focused on the workforce preparation and recruitment phase. These strategies include offering perioperative nursing electives in undergraduate programs and orientation programs for newly graduated nurses or nurses from other specialties. While these training programs are beneficial for attracting and retaining new perioperative nurses, they may have drawbacks. The majority of articles advocating for educational programs are centred on the US, which limits the generalisability of this approach. In the US, nursing is the only healthcare profession with multiple entry-level educational pathways [153]. This concept may be applicable in countries such as the US, New Zealand, Australia, India, Sweden, and Greece, where specialty training can commence at various educational levels [29, 31, 93, 154–157]. However, it may not be the same in Portugal, where specialty skills can be acquired through localised training, and in countries such as Belgium, Poland, and the Netherlands, where postgraduate education is a prerequisite for entering the specialty [31]. In Spain, centralised workforce planning poses obstacles to specialisation programs for nurses, particularly as perioperative nursing remains unrecognised [31]. In Turkey, nursing holds a lower social status [158], and within perioperative nursing,

the roles are limited to instrument and circulating nurses. Certification in this specialty requires two years of experience although specialised master's and doctoral programs are also offered [32].

Enhancing perioperative nursing recruitment via educational programs requires various factors to be considered. The success of training programs reportedly depends on the inclusion of all stakeholders, such as executive leaders, nursing managers, educators, preceptors, and students themselves, as suggested by two US-based quality improvement reports [22, 88]. Using a standardised course can help reduce local orientation cost and time, such as Periop 101: A Core Curriculum [43, 55, 56, 89, 101, 107, 112–114, 119], suggesting the need for similar programs globally. Facilities should weigh the drawbacks of solely focusing on recruiting and training new perioperative nurses. Many universities and local facilities lack the capacity to accommodate a surge in trainees [25]. AORN surveys indicate that experienced perioperative nurses often quit due to the strain of continuously training newcomers [8, 78–85]. Also, younger registered nurses were found to change employers faster than older nurses [25]. Reportedly, the turnover rate of perioperative nurses is between 13% and 75% in their first three years working in this specialty [88, 123, 159].

The retention of currently employed perioperative nurses is crucial, given the established link between the staffing of competent nurses and the quality of patient care. The knowledge and skills of senior nursing staff are a valuable resource in the perioperative department [29, 160]. As in other specialties, experienced perioperative nurses build up their knowledge, critical thinking, and extensive skills from years of experience and professional growth [160, 161]. The benefits of retaining these experienced perioperative nurses include saving costs in training new recruits [160], maintaining the stability and intellectual property of this nursing population, achieving high-quality patient care and having experienced mentors to guide students and novices [21, 150]. Strategies to manage perioperative nursing attrition, especially for nurses nearing retirement age, are understudied as per the selected articles. It has been indicated that perceptions about older perioperative nurses among nursing managers are often negative, according to qualitative studies conducted in Europe [162] and Australia [163]. Making this group of perioperative nurses active even postretirement could potentially help reduce the shortage levels. A scoping review in 2018 found that nurses' intentions to work after retirement ranged from 18.3% in Singapore to 73.2% in Australia [164]. The personal preference for delaying the retirement age, together with the intention of the government to raise the retirement age, for example, from 65 years to 67 years by 2028 in the UK, can be a promising solution for narrowing the nursing shortage gaps [165]. It was suggested that the retention of retirement-aged nurses be integrated into the national nursing workforce planning and workplace wellbeing policies [166].

This review highlights the importance and necessity of regular and routine monitoring of staffing issues within healthcare systems [65, 66]. Besides the ten AORN survey

reports, which provided detailed insights into the contributing factors to shortages in the perioperative nursing workforce in the US, none of the other studies identified similar measures. Nonetheless, even with regular monitoring, the situation may vary in other countries. For instance, in Iceland, the turnover rate could be markedly different from that in the US, as nurses in certain specialties may not have the option to change workplaces without leaving their specialty or country despite having a high intention to leave [125]. In Spain, nurses are assigned according to healthcare authorities' planning and redistributive policies, which might drive nurses to explore job opportunities overseas, thereby exacerbating the nursing outflow [31, 168].

Programs such as the Magnet Recognition Program® can be used to help the retention of the current perioperative nurses. The Magnet Recognition Program®, established by the American Nurses Credentialing Centre in 1981, focuses on the establishment of professional organisational characteristics and achieving high job satisfaction for nurses [169]. Up to 2022, 591 hospitals in the US [170] and eight non-US hospitals hold Magnet® designation, three of which are in Australia [171]. Improved job satisfaction and reduced nursing turnover were reported by two Australian articles [172, 173]. Another cross-sectional study among Magnet®-employed nurses in Australia indicated a high level of job satisfaction and intention to stay in a better working environment than their international counterparts [171]. Internationally, multiple articles reported similar results [174–177]. A systematic review covering 17 papers supported the positive effect of Magnet® designation on the professional nurse practice environment, leading to reduced burnout, higher satisfaction, improved quality of care, and decreased intent to leave among Magnet® nurses [178]. This program, however, was not highlighted in the selected articles of the current review. It is suggested that health organisations consider this program or establish similar programs that fit local facilities.

5. Conclusion

This study examines the global shortage of perioperative nursing professionals, identifying key contributing factors such as high demand for surgical services, limited new entrants, and high turnover rates. While challenges like aging demographics are beyond control, interventions targeting workforce preparation and recruitment are proposed. However, limited evidence supports the retention of current perioperative nursing staff, with most focus on identifying contributing factors. Furthermore, the lack of comprehensive solutions and comparative assessments underscores the necessity for additional research. Extensive, practical, and adaptable approaches are crucial, particularly given the diverse regulatory landscapes across countries.

5.1. Implication for Nursing Management. The finding of this review highlighted the critical importance of perioperative nurses' wellbeing in relation to nursing retention. Increasing evidence suggests that effective leadership is critical to any

multidimensional workforce planning strategy [21, 150]. As nursing managers shape the culture of a unit, perioperative nursing managers play a critical role in resolving staffing issues associated with workplace culture [11]. Any change initiatives, such as culture change, begin with management as the critical change agent [11, 179, 180]. They influence the professionalism of staff as role models [181]. The role of perioperative nursing managers in monitoring nursing turnover trends and evaluating the implications of workforce change has been emphasised, as less frequent monitoring may miss warning signs of workforce issues [167]. With support and resources from the organisation, nursing managers play an essential role in establishing a civil and collaborative work atmosphere and providing opportunities for staff development [148]. Based on a good understanding of human development as per Maslow's theory [182], managers providing career planning guidance to nursing staff according to their characteristics and level of experience is highly valued [183]. As effective leadership is critical to the success of the department, perioperative nursing succession planning should include perioperative nurse managers [161]. In addition, perioperative managers also have their own challenges [1, 2, 184, 185]. Besides "on-the-job training" opportunities [181], they should have continual access to various forms of support, ongoing education and training throughout their tenure as leaders [185], career planning, and continuous professional development so that they can support the workforce and address challenges [184]. The US has required specialty certification for perioperative managers as a standard of care to lead the transformative changes [181]. It is recommended that similar programs be used in other countries to allow perioperative leaders to acquire the knowledge and skills in their roles.

5.2. Indication for Further Research. Research on retaining older perioperative nurses as they approach retirement age is lacking. There is a need to understand their career plans, desired retirement age, and other factors affecting retirement decisions. In addition, while this review included 84 studies, the evidence varied in quality and utilised limited study designs. Furthermore, there is a lack of research or quality improvement programs employing coordinated methods and reliable measurement tools to address perioperative nursing shortages.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Additional Points

This review's strength lies in its rigorous and reliable study process, encompassing diverse data sources and study types and two reviewers' involvement in article selection and quality appraisal. However, restricting the language to English may have resulted in excluding relevant studies in other languages. In addition, the majority of studies was conducted in the US, potentially limiting the generalisability of findings to other countries.

Ethical Approval

Ethical approval was not required because the review drew upon literature within the public domain.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

The Supplementary Materials comprise three files detailing the search strategies, study characteristics, and appraisal results of the selected articles. (*Supplementary Materials*)

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Research Article

Perspectives on Work in the Continuing Care Sector during and after the COVID-19 Pandemic: A Mixed-Method Design

Lindsay M. Guest ¹, Janet McCabe ¹, Chase O'Halloran,¹ Maryam Rana,¹ Winnie Sun ¹, and David Rudoler ^{1,2}

¹Faculty of Health Sciences, Ontario Technology University, Oshawa, ON L1G 0C5, Canada

²Ontario Shores Centre for Mental Health Sciences, Whitby, ON, Canada

Correspondence should be addressed to David Rudoler; david.rudoler@ontariotechu.ca

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Background. Improving the recruitment and retention of healthcare workers in the continuing care sector is critical to ensuring adequate care for older adults, which was highlighted following the COVID-19 pandemic. **Purpose.** The purpose of this study was to understand the perceptions of prospective registered nurses about working in the continuing care sector and identify workplace attributes that attract prospective nurses to the sector. **Methods.** A sequential mixed methods study was conducted with nursing students at Ontario Tech University. Focus groups ($n = 14$) asked students to comment on views about working in the continuing care sector, and job attributes that may attract them to the sector. Focus group data were analyzed using thematic analysis. Subsequently, a cross-sectional survey asked students to respond to elicited choice job scenarios that varied job attributes. The job attributes were shaped by the focus group interview data. To assess respondent's preferences, the survey data ($n = 139$) were analyzed to generate willingness-to-pay (WTP) values for each job attribute. **Results.** Focus group interviews suggested that fair compensation, optimal client-to-staff ratios, unionized work environments, comprehensive benefits packages, and flexible work arrangements were important job attributes. In survey results, 18.0% expressed interest in working in the continuing care sector compared to 75.5% in acute care. Regression analysis suggested that higher amounts of paid vacation (WTP: -5.983 ; 95% CI: -13.749 and -0.037) and higher risk of injury (WTP: 0.684 ; 95% CI: 0.124 and 1.208) were associated with work in the continuing care sector. **Impact.** Continuing care workplaces can attract nurses by offering flexible options such as part-time positions and paid vacation and by taking actions that can mitigate the risk of workplace injury, violence, and abuse. Nursing students should be shown the positive aspects of working with older adults and dispel negative perceptions about the continuing care sector. Further research is needed to understand the preferences for work and risk perceptions among currently employed nursing staff.

1. Introduction

Globally, the recruitment and retention of healthcare workers in the continuing care sector is an increasingly significant challenge [1, 2]. Continuing care in Canada describes a complex system which includes delivery of all services provided by long-term care, home care, and home support (e.g., nursing homes, long-term care, and supportive living facilities), and combines aspects of both health and social services [3]. Typically, this is an undervalued workforce within Canadian society [4]. During the best of times,

the continuing care sector has experienced difficulty recruiting and retaining healthcare workers [5–7]. It has been suggested that the sector suffers from a workforce crisis, where staffing levels are never high enough to meet demands [8]. Recruitment and retention challenges have been linked to workplace attributes, including staffing ratios as high as 1 worker to 40 clients, wages that are at market minimums, and precarious and part-time work [8–10].

Another important workplace attribute in the continuing care sector is workplace safety. A Canadian study found that more than 40% of institutional continuing care

workers experience physical violence on a daily basis [11]. Understaffing, inappropriate resident placement, frequent and infrequent work, night shift work, lack of communication, and lack of collegial support have all been cited as causes of workplace violence [8, 11]. The perception that there are workplace risks, whether they exist or not, leads to challenges in recruitment for the continuing care sector, and the experience of safety risks on the job makes retaining staff difficult.

Workplace safety came to the fore during the COVID-19 pandemic, with the Canadian continuing care sector being hit particularly hard by the disease, with devastating effects for residents, families, and the workforce. According to early 2021 data, continuing care facility residents accounted for more than 60% of COVID-19-related deaths in Ontario [12]. Other resources have estimated that between 62% and 82% of deaths due to COVID-19 have been among residents of continuing care facilities, and 5 of 7 Ontario healthcare workers who have died from COVID-19 were personal support workers in the sector [4]. Low staff levels, part-time workers operating in multiple sites, lack of testing, and lack of personal protective equipment have been blamed for preventable COVID-19-related deaths in the sector [4]. These unfavourable working conditions contribute to job dissatisfaction in the continuing care sector, exacerbating the recruitment and retention crisis.

Nurses are critical healthcare providers who can best meet the growing demands imposed on the healthcare system by an aging population [13]. Unfortunately, clinical placements in continuing care facilities have frequently been unsatisfactory and/or unsettling for undergraduate nursing students, discouraging them from working in the continuing care sector in the future [14]. Understanding the perspectives of working in the continuing care sector is essential to ensure that nurses in this field have the necessary support and resources to provide quality care to their patients. Nurses face many challenges on the job, such as complex patient needs, increases in absenteeism, worsened mental health, overtime hours, and a high level of emotional labour [15, 16]. These challenges highlight the need for healthcare organizations to implement policies and practices that support the well-being of healthcare workers. This, in turn, can improve the quality of care delivered to patients.

Improving retention and recruitment efforts is critical to attracting new nurses to the field in order to service the increasing population over the age of 65 in need of healthcare services [15]. It is estimated that Canada will need to increase its healthcare workforce (across different sectors) by 80% by 2040 [17] to keep up with the current demand. The national turnover rates currently range from 8.8% to 37.0%, with variations depending on the nursing specialty and geographical location [18]. A high turnover rate in the nursing workforce can lead to lower quality of care, increased costs, and decreased patient satisfaction [18]. Increasing wages is one solution to recruiting and retaining a nursing workforce, but there may be other workplace attributes that can be utilized to attract and retain workers. These attributes include benefit packages, vacation time, staff-to-client ratios, safety, and more [4, 8–11]. Currently,

there is limited research highlighting preferable work attributes within prospective nurses, especially in the Canadian continuing care sector, indicating a gap and need for research in this area.

The purpose of this study is to understand the perceptions that prospective registered nurses have about working in the continuing care sector and the workplace attributes that could attract prospective nurses to the sector. This study addresses the following research questions: (1) What are the major concerns of prospective nurses about working in the continuing care sector during and after the COVID-19 pandemic? and (2) What workplace attributes could attract prospective nurses to the continuing care sector?.

2. Materials and Methods

2.1. Design, Setting, and Participants. A sequential exploratory design was completed for this mixed-methods study [19]. The qualitative descriptive methodology was used first through focus group interviews, followed by quantitative survey methodology. The quantitative survey instrument was built based on the qualitative data that were previously collected during the focus group interviews. Participants were recruited using the convenience sampling method. Nursing students who were included in the study were enrolled at the University, where the research team was employed. The study interviewed nursing students to understand the perceptions they have about how to retain and recruit healthcare workers in the continuing care sector. Subsequently, an original survey instrument was used to elicit preferences for job attributes [20]. All persons who participated in the study were enrolled in the Bachelor of Science Nursing program at Ontario Tech University in Oshawa, Ontario. The four-year program is offered in collaboration with Durham College, and students have a practicum placement focused on the care of older adults in year 1 of their studies. The nursing program at Ontario Tech University is committed to offering students state-of-the-art learning environments, experience with leading-edge technology, and support praxis through clinical placements and simulation, positioning students for a successful career in healthcare and other sectors. The program had 840 enrolled students in the 2022/23 academic year.

This study was reviewed and approved by the Research Ethics Board at Ontario Tech University, Oshawa, ON, Canada (REB #16402).

2.2. Focus Groups: Data. A semistructured interview guide [21, 22] (see Supplementary Materials-Appendix A) was constructed by the research team for the focus groups. The focus group data collection was carried out between the University's fall semester of 2021 and the fall semester of 2022. Students were recruited via e-mail and asked to reach out to the research team to express interest in participating in the focus groups. One member of the research team (LG) hosted each focus group to maintain consistency. Interaction and discussion between participants were encouraged as much as possible. Focus groups were held

virtually via Google Meet. Prior to each focus group, the researcher explained the purpose of the study, that participation was voluntary, the student's right to withdraw at any moment, that all data collected would be kept confidential, and that all identifiers would be removed. Before the online focus group began, each participant provided informed verbal consent. A demographic datasheet was completed by each attendee once informed consent was collected. The focus groups were audio and video recorded and transcribed verbatim. Transcripts were cleaned and all identifiers were removed prior to being shared with the remainder of the research team. Two members of the research team (DR and JM) reviewed the deidentified transcripts for familiarity prior to analysis. Data saturation was reached after 6 focus groups. Each focus group involved 2–4 students. The final focus group sample consisted of 14 participants.

2.3. Focus Groups: Data Analysis. Braun and Clarke's thematic analysis [23] was used to derive overarching themes from the focus group transcripts, highlighting relevant workplace attributes to inform the development of an elicited choice survey, a form of stated preference survey [24]. The data were carefully examined to identify patterns and latent level themes, which refer to underlying ideas not immediately apparent in the data. This process resulted in the development of a coding system. To ensure intercoder reliability [25], two researchers independently generated an initial code list in Microsoft Word and discussed it, reaching over 80% agreement [26]. The initially drafted codes were further developed into themes and subthemes after a rereading of the transcript data and subsequent discussions between DR and JM. A draft coding system was then provided to three other researchers (LG, CO, and MR) who applied the coding system to the transcript data, and through iterative team discussions, reached consensus on the coding system. The coding system was developed deductively and inductively. Our interview guide included specific workplace attributes derived from our review of the literature (e.g., compensation, workplace safety, vacation time, and benefits), and these same categories were incorporated into our initial codebook. However, given the lack of research on workplace preferences in the continuing care sector, we allowed for additional themes to be grounded in the raw data extracted from the focus group transcripts. Data analysis was conducted in English, the same language in which the focus groups were conducted.

2.4. Survey: Data. An online cross-sectional survey (see Supplementary Materials-Appendix B) was used to collect self-report data from students in the nursing program at Ontario Tech University during the fall 2022 semester. The survey was inspired by the work of Wiswall and Zafar, who used a survey instrument to study preferences for workplace attributes in a sample of undergraduate students at New York University [20]. Our survey consisted of the following five sections: a demographic section followed by four sections of hypothetical job scenarios. The demographic section

collected data on year of study, age, gender, cumulative grade point average (GPA), plans postgraduation, whether they intend to work in the continuing care sector postgraduation, as well as postgraduation salary expectations. The remaining sections each contained eight job scenarios, with each scenario consisting of three job offers. The job offers differed by four attributes in each scenario. Participants were instructed that each attribute was identical across the job offers. We varied the job offers by the following attributes: hourly wage, percentage wage increases per year, vacation time, benefits, staff-to-patient ratio, patient acuity, hours worked per week, part-time option, unionized work environment, consistent shift hours, training and development opportunities, probability of being fired, and risk of workplace injury. Job attributes that were deemed most important to the participants in the focus group interviews were used in the construction of the job offers used in the survey. Other job attributes were inspired by those highlighted in the literature. Each of the offers was varied by four attributes at a time, and the values of the attributes (e.g., hourly wage) were designed to be as realistic as possible. We used new hire and union packages [27, 28] from local government-funded facilities and expert opinion from professionals in the continuing care sector in Ontario, Canada to develop realistic job attributes and variations in the attributes. Further details about how the job scenarios were constructed are provided in Supplementary Materials-Appendix C.

The survey allowed participants to provide elicited choice probabilities, which permitted respondents to show uncertainty about their preferences [24]. Participants were asked to rank each of the three hypothetical job offers in each scenario by assigning a percentage likelihood of choosing the scenario. Participants were informed that all values must sum to 100. Examples of these job scenarios are provided in Table 1. The survey data were extracted from the Ontario Tech University secured survey program (LimeSurvey).

2.5. Survey: Data Analysis. First, we estimated descriptive statistics for all variables in the demographic section of the survey. Following from Wiswall and Zafar [20], for our main analysis we estimated the log-odds of choosing each job as a function of the difference levels in job characteristics between job choices. To ensure the log-odds representation of our outcome variable, we made slight adjustments (adding or subtracting by 0.0001) to probabilities that were either 0 or 1. This was necessary because without these adjustments, the log transformation would not be valid. To account for the measurement error introduced when people round their choice probabilities to units of 5% or 10% during self-reporting of preference data, we utilized a least absolute deviations (LADs) estimator. Unlike the ordinary least squares estimator, which minimizes the squared differences between observed and predicted values, the LAD estimator minimizes the absolute differences. This approach increases the robustness of estimates by mitigating the impact of outliers and measurement errors [24].

TABLE 1: Example choice scenarios.

Section A	Hourly wage	Annual percentage increase in earnings	Average work hours per week for full-time	Work flexibility: is part-time available?
<i>Example</i>				
Job 1	\$35.36	2%	35	Yes
Job 2	\$35.94	2.5%	40	No
Job 3	\$34.00	3%	44	Yes
Section B	Hourly wage	Probability of you being fired or laid off from the job in the next year	Union vs. nonunion environment	Staff-to-patient ratios
<i>Example</i>				
Job 1	\$38.97	1%	Union	1 : 61
Job 2	\$38.33	3%	Nonunion	1 : 90
Job 3	\$38.48	7%	Union	1 : 56
Section C	Hourly wage	Amount of vacation of paid time off	Shift work/rotation/preferable hours	Opportunity for training and development
<i>Example</i>				
Job 1	\$36.54	4 weeks	Consistent shifts	\$2,208
Job 2	\$39.00	3 weeks	Rotation shifts	\$3,996
Job 3	\$40.93	2 weeks	Consistent shifts	\$3,956
Section D	Hourly wage	Available benefits and pension package	Risk of injury on the job	Patient acuity
<i>Example</i>				
Job 1	\$36.84	13%	6.2	Stable
Job 2	\$36.67	10%	13.7	Moderate
Job 3	\$40.63	9%	24.8	Complex

We estimated a separate model for each participant who responded fully to each of the job scenarios. During the survey, participants were presented with 32 different scenarios and were asked to assign probabilities to three job options in each scenario. Since job 1 was used as the base case in each model, each participant had $32 \times 2 = 96$ unique observations. Job 1 was used as the reference case in each model, so 64 observations per participant were used in the regression model. We obtained coefficient estimates by averaging coefficients for each job attribute across participants. To perform inference, we used block bootstrap resampling, repeating the estimation process 5,000 times by randomly drawing participants (with replacement) from the sample. We then calculated the 95% bootstrap confidence intervals using the 2.5th and 97.5th percentiles of the resampling distribution. We also presented these results as individual-level willingness-to-pay (willingness-to-accept) statistics. All regression analyses were performed using R version 4.1.2. LAD estimates were generated by using the LAD function from the L1pack package [29].

3. Results

3.1. Focus Groups: Participant Characteristics. The focus group participants consisted of 14 Ontario Tech University nursing students; 3 (21.4%) male and 11 (78.6%) female (Table 2). Most focus group participants were under the age of 30 and represented a variety of ethnicities. Four participants had previous experience working in a continuing care setting.

3.2. Focus Groups: Data-Derived Themes and Codes. The findings from the focus groups revealed three important themes: (1) workplace attributes that support recruitment, (2) workplace attributes that support retention, and (3) perceived risks and fears related to work in the continuing care sector (Table 3).

A recurring theme among the focus group responses was *the work attributes of the workplace perceived to support recruitment* and thereby were enticing to the prospective nurses. Participants discussed attributes including adequate compensation, a preference for a unionized environment, the importance of comprehensive benefit packages, appropriate client-to-staff ratios, and work schedule flexibility. Client-to-staff ratios were raised several times by the participants, across all three themes in different ways. Students were concerned about the high patient-to-registered nurse ratios and the fact that high ratios increase the physical and emotional demands of nursing, limit one's ability to form personal relationships with clients, and may place nursing staff in situations which pose ethical dilemmas.

The second occurring theme among the focus group responses was *the work attributes that support retention*. These attributes reflect elements that are aimed at keeping the individuals employed over longer periods of time. Elements included a comprehensive orientation period which included information on roles, responsibilities, and expectations. Participants also highlighted staffing complements

TABLE 2: Focus group demographics.

Variable	Frequency	Percent (%)
<i>Year of study</i>		
1 st year	7	50
2 nd year	2	14.3
3 rd year	1	7.1
4 th year	4	28.6
<i>Age range</i>		
18–29	9	64.3
30–39	1	7.1
40–49	4	28.6
<i>Gender</i>		
Male	3	21.4
Female	11	78.6
<i>Ethnicity</i>		
Caucasian	3	21.4
African-American	4	28.6
Asian	3	21.4
Two ethnicities or more	2	14.3
Other	2	14.3
<i>Highest education</i>		
High school diploma	5	35.7
College	3	21.4
Bachelor's degree	5	35.7
Master's degree	1	7.1
<i>Continuing care placement</i>		
Yes	2	14.3
No	10	71.4
No, but employed in LTC	2	14.3

as a means of retention, with importance on the ratio and number of staff that form the care team, and the nature of the roles (personal support workers, registered practical nurses, and registered nurses). Additional elements cited were opportunities for continued growth and education along with skill development, the ability to form relationships with the clients, and working in an environment in which there were positive working relationships and support from both colleagues and management.

The final theme that emerged from the focus group responses was *the perceived risks and fears related to working in the continuing care sector*. Participant responses reflected both real and perceived risks and fears about working in the continuing care sector including the potential for abuse and violence towards the RN as well as towards the patients, and being engaged in situations that promoted or reinforced low standards of care which would lead to ethical and moral dilemmas. Furthermore, participants were concerned about the potential of knowledge and skill decay of acute care level skills if one was to spend a significant amount of time within the sector. The potential for burnout was a perceived risk, and participants spoke separately of the perceived fear of the physical and emotional toll of the work, including the potential for injury, and the nurse as martyr framework that pervades nursing as giving when you have nothing left to give, or giving and caring with little to no attention to one's own needs. The potential for understaffing and inadequate skills' mix of staff was a concern, along with a concern about the availability of the proper technology and equipment to properly function. Lastly, participants raised concerns about

TABLE 3: Focus group's data-derived themes, codes, and selective illustrative quotes.

Theme	Code	Illustrative quote
Workplace attributes that support recruitment	Adequate compensation	"Wage compensation is important for me"
	Unionized environment	"Unionized environment is very important"
	Benefits	"I would like to work full-time when I get a job because of benefits"
	Client-to-staff ratio	"We don't have enough time because there just two of us to take care of 15 people in the morning, we have to get six people up. You don't have enough time to do much"
Workplace attributes that support retention	Work flexibility (personal choice)	"You need to know what you're going to be working on and it needs to be predictable set of shifts"
	Orientation	"I'm told what my job expectations are and if I have someone to guide me as to how to do my duties and teach me, those are things I look for in an orientations that can prepare me for success in my job"
	Staffing complement	"I'll say the issues with staffing, for example, if they have adequate staff so that there's no burnout. I work in a long-term care, we get burnt out. We work so many hours because people don't show up for work. So I'd like a workplace that has adequate staff"
	Continued education, training, and skill development	"I'm looking for a place to build a career in. So for me I would like opportunities for advancement, you know if I wanted to take a specialty or move up then I want to be able to stay within the same organization"
	Personal relationships with clients	"So in my experience, it's just the relationships that you get to make with residents again because you're seeing the same people, you know, daily or weekly"
	Reliable and supportive coworkers/management	"So I agree with everybody that the main thing is respect for the employee, so respect for me as an individual, but also a group. If I feel like management cares about me, then I care about the job more"

TABLE 3: Continued.

Theme	Code	Illustrative quote	
Perceived risks and fears related to work in the continuing care sector	Abuse and violence	<p>“A risk of injury and verbally, emotionally, and trauma, I think that is very important to have security in place. You want more to minimize any kind of injury, like physically, verbally, and emotionally”</p>	
	Ethical and moral dilemmas	<p>“It doesn’t allow you to actually provide adequate care for a patient because, for one thing, in the back of your mind you’re concerned about getting all your meds done, but you’re not actually getting to analyze”</p>	
	Knowledge and skill decay	<p>“It’s really easy to forget, really simple things”</p>	
	Burnout	<p>“The workload in the nursing home is too much”</p>	
	Understaffing and poor skill mix	<p>“We don’t have enough time because they’re just two of us to take care of 15 people in the morning, we have to get six people up. You don’t have enough time to do much”</p>	
	Physically and emotionally demanding work	<p>“I would be most concerned about the risk of injury. I think I would try to have a job that is on the lower side of risk of injury”</p>	
	Working in public vs. private long-term care homes	<p>“Because sometimes you have to think a little selfish and think of things that benefit you and if you have a family, that can benefit your family, take vacations, have time for yourself to just relax, away from work”</p>	
	Availability of resources	<p>“But like as soon as it came down to making a profit, a lot of standards went out the window or they try to get away with like sweeping it out of the door, really quietly”</p>	
			<p>“My previous placements, when I asked where the suction is, and where the crash cart is they’re like “oh, we don’t have one””</p>
			<p>“...If you see someone who’s had a stroke and they clearly need way more care than they’re getting, it’s difficult to not be able to do anything”</p>

working in private or for-profit environments versus public care facilities, as many perceive public care facilities to be professionally enticing.

3.3. Survey: Participant Characteristics. Table 4 shows that 139 participants completed the demographics section of the survey. This represents approximately 20% of the four-year collaborative nursing program. The survey included 46 first-year students, 23 second-year students, 36 third-year students, and 34 students in their fourth or fifth year. Of the participants, 16 (11.5%) identified as male and 120 (86.3%) identified as female, gender nonconfirming, or other. Most participants were under 30 years old, which is typical for university-age students. Ontario Tech University uses a 4.3 GPA scale. The average cumulative GPA of the participants was 3.4 (SD = 0.451), equivalent to a B+. Out of the total participants, only 25 (18%) expressed interest in working in the continuing care sector after graduation. Most participants intended to seek full-time employment after graduation, with an average salary expectation of \$65,654.14 (SD = \$22,741.98).

3.4. Regression Analysis. Of the 139 participants in the survey, 67 fully responded to each of the job scenarios in the survey. We limited our regression analysis to the 88 participants who did not miss more than one job scenario in each of the four sections. In Appendix D, Table A1 in the Supplementary Materials, we compare the demographic characteristics of those included in the regression analysis with those who were excluded. Gender, choice of nursing sector, cumulative GPA, and salary expectations were similar across these groups. While none of the differences between the groups were statistically significant (p values >0.1), those who were included in the regression analysis tended to be older, in higher years of study, and more likely to report working full-time after graduation.

Table 5 shows our regression estimates. We interpret the sign of these estimates since the magnitudes are difficult to interpret. Thus, higher hourly wages, wage increases per year, part-time options, unionized environment, vacation time, consistent shifts, and training and development were positive predictors of the hypothetical job preference. Meanwhile, hours worked, probability of being laid off, staff-to-client ratio, risk of injury, and patient acuity were negative predictors of hypothetical job preference.

Table 6 shows the willingness-to-pay (WTP) estimates. These can be interpreted as the increase in hourly wages needed for prospective nurses to accept an undesirable workplace attribute, or wages nurses are willing to forgo for a desirable attribute. Only vacation and risk of injury had statistically significant WTP estimates. On average, respondents were willing to forgo \$5.98 in hourly wages for a one-week per year increase in paid vacation time. While this estimate suggests respondents highly valued paid vacation, our data were consistent with a wide range of WTP values (95% CI: -13.749 and -0.037). On average, respondents needed to receive an increase of \$0.68 in hourly wages to accept a 1% increase in the risk of injury (95% CI: 0.124 and 1.208).

TABLE 4: Survey demographics.

Variable	All
Number of participants	139
Gender	
Male	16 (11.5%)
Female, gender nonconforming, and other ¹	120 (86.3%)
Prefer not to answer	3 (2.2%)
Year of study	
1st year	46 (33.1%)
2nd year	23 (16.5%)
3rd year	36 (25.9%)
4th and 5th year ²	34 (24.4%)
Age group	
18–21	72 (51.8%)
22–29	34 (24.5%)
30–39	15 (10.8%)
40+	18 (12.9%)
Cumulative GPA ³	3.4 (0.451) ⁴
Future nursing sector ⁵	
Home community care	36 (25.9%)
Continuing/long-term care	25 (18.0%)
Primary care	59 (42.4%)
Acute care	105 (75.5%)
Do not plan on working in healthcare	1 (0.7%)
After graduation plans	
Work Full-time	103 (74.1%)
Work Part-time	9 (6.5%)
Other ⁶	27 (19.4%)
Salary expectations ⁷	\$65,654.14 (22,741.98) ⁴

¹Combined due to small cell sizes. ²One respondent in 5th year. ³Based on 125 observations. ⁴Std. dev. ⁵Based on 130 observations. ⁶Combines the following categories: attend graduate or professional school, take time off, and other. ⁷Based on 133 observations.

4. Discussion

This study aimed to explore the views of aspiring registered nurses regarding employment in the continuing care sector. Focus group interviews conducted with nursing students revealed key job attributes for recruitment, including fair compensation, optimal client-to-staff ratios, unionized work environments, comprehensive benefit packages, and flexible work schedule arrangements. Client-to-staff ratios were brought up several times during the interviews, and students highlighted the effect these have on nurses' ability to provide safe and compassionate care. Participants were also concerned about the real and perceived risks of working in the continuing care sector, including the potential for abuse and violence toward healthcare workers and patients. There was also an expressed concern about the skill and knowledge decay, particularly while working long-term in the continuing care sector.

These perspectives on workplace attributes informed the development of a survey of nursing students at Ontario Tech University, particularly the hypothetical job scenarios. Although there was considerable variation in the individual preferences expressed in the survey data, two attributes more consistently stood out as important to prospective nurses: paid vacation and risk of injury. The preference for jobs with

TABLE 5: Survey regression analysis results.

Number of participants	<i>n</i> = 88		
Variable	Estimate	Std dev.	95% CI
Hourly wages	0.241	0.038	(0.168, 0.319)
Wage increase per year	0.451	0.113	(0.226, 0.671)
Hours worked	-0.092	0.019	(-0.13, -0.057)
Part-time option	0.763	0.237	(0.319, 1.265)
Probability of being laid off	-0.185	0.051	(-0.291, -0.089)
Unionized environment	1.291	0.205	(0.909, 1.706)
Staff-to-client ratio	-0.053	0.008	(-0.069, -0.039)
Vacation	0.531	0.143	(0.254, 0.813)
Consistent shifts	1.394	0.343	(0.707, 2.074)
Training and development	0.035	0.013	(0.009, 0.061)
Benefits	0.075	0.078	(-0.074, 0.230)
Risk of injury	-0.137	0.019	(-0.176, -0.100)
Patient acuity	-0.481	0.094	(-0.679, -0.306)

TABLE 6: Survey willingness-to-pay (WTP) regression analysis results.

Number of participants	<i>n</i> = 88		
Variable	WTP	Std dev.	95% CI
Wage increase per year	-1.378	1.156	(-3.573, 0.951)
Hours worked	0.142	0.378	(-0.622, 0.856)
Part-time option	-0.811	6.466	(-12.665, 13.093)
Probability of being laid off	-0.262	1.620	(-3.901, 2.346)
Unionized environment	-8.631	9.852	(-29.066, 10.171)
Staff-to-client ratio	0.341	0.325	(-0.17, 1.09)
Vacation	-5.983	3.425	(-13.749, -0.037)
Consistent shifts	-8.451	9.418	(-25.532, 11.284)
Training and development	-0.493	0.507	(-1.613, 0.365)
Benefits	-0.090	0.751	(-1.534, 1.403)
Risk of injury	0.684	0.280	(0.124, 1.208)
Patient acuity	0.910	5.150	(-10.383, 10.106)

longer periods of paid vacation aligns with the emphasis on workplace flexibility and work-life balance that arose during the focus group discussions. Similarly, the preference for jobs with lower risk of injury reflects the concerns expressed about safety in the continuing care sector.

Few previous studies have explored the preferences for workplace attributes in the continuing care sector or the views of prospective nurses. One study conducted in South Korea surveyed recently graduated nurses on the importance of different workplace attributes. They found that salary, working conditions, and organizational climate were the most important factors when choosing a workplace [30]. Studies conducted in other countries (such as Australia, South Korea, the United States, the United Kingdom, China, and France [13, 31–39]) have focused on the perspectives of nurses already working in their continuing care sectors and the factors that contributed to their decisions to leave the sector. These studies highlighted job security [31, 32], workplace safety [33, 34], favourable work hours [13, 31, 35–37], paid vacation [36, 37], recognition of work [38], and sick leave [32, 34, 39] as important workplace attributes. These studies show some overlap with the factors identified in our data, but other factors may have emerged given differences in context and differences in career stages. Further research in the Canadian context on the views of practicing and later career nurses is needed to understand

how preferences for workplace attributes may evolve later in their careers.

Our focus group and survey data also indicate a lack of enthusiasm for working in the continuing care sector. Specifically, we found that only 18% of survey respondents expressed interest in working in this sector after graduation. This is striking in contrast with the 76% who showed interest in working in acute care. Previous research has identified a similar apprehension. For example, the study conducted in Australia noted that only 8% of undergraduate nursing students chose to work with older adults, and this preference further declined throughout their studies [40]. Another survey of nursing students conducted in the United States found that while attitudes toward working with older adults improved over the duration of their studies, working with this population consistently ranked last for workplace preferences [41].

The results emphasize that ageist views and stigma towards the continuing care sector are prevalent within an undergraduate nursing population. Nursing education programs (both at the Bachelor level and Diploma level) need to work to actively to address these views to improve the recruitment of healthcare professionals into the continuing care sector. Several solutions to these problems have been suggested in the literature, including curricula reviews to ensure that there is a focus on the needs of older adults,

access to role models who can positively promote work in the sector [42], practicum experiences in the continuing care sector [41], and integrating gerontology focused simulations into nursing programs [43]. Focus on spreading out practicum experiences throughout the duration of a degree or diploma would be important as this could assist students in connecting continuing care with early-level learning and increase student's understanding of the complexity of continuing care. Concerns about skill decay in the continuing care sector may also be reinforced by the curricula that focus on the technical aspects of nursing, which may direct prospective nurses to the acute care sector [42]. Overall programs could focus on student attitudes toward older adults as well as highlighting the skills required of those nurses working in the sector, and the opportunities that are available (e.g., gerontology certificates and the use of technical skills specific to continuing care).

More research is needed on multilayered educational interventions to better understand how to support students who enter the continuing care sector after graduation. It is important to go beyond just studying student attitudes toward elderly populations, as it is unclear if attitude alone is the main factor influencing work location.

Workplaces within the continuing care sector also have a role in addressing the perception of working in the sector. The creation and promotion of work environments that allow staff to exercise their full scope of practice (for registered nurses and registered practical nurses) would allow for both caring relationships and the use of technical skills. Furthermore, workplaces that provide patient-to-nurse ratios that allow for the development of caring relationships may ease negative perceptions concerning workload. High registered nurse-to-patient ratios also limit the opportunity to work to one's full scope of practice and may limit the roles and responsibilities that registered nurses take on within the sector. Educational organizations can play their part by highlighting the potential for practicing to one's full scope of practice during practicum experiences.

Workplaces in the continuing care sector can attract prospective nurses by providing flexible work options, including part-time positions and paid vacation. In addition, it is important for these workplaces to take measures to reduce the actual or perceived risks of workplace injury, violence, and abuse. This is especially important after the COVID-19 pandemic, which may have exacerbated perceived risks. Some evidence suggests that risk-averse nurses tend to overestimate the risks associated with their job [44]. Further research is necessary to understand the risk perceptions of both prospective and currently employed nursing staff [45]. Currently, there is a lack of studies examining interventions aimed at addressing workplace risk perceptions.

4.1. Limitations and Strengths. In the study, there were several limitations that should be taken into consideration. First, the focus group sample size included 14 participants interviewed during six different focus group meetings. Despite the small focus group sample size, the aim of our qualitative descriptive study is to achieve transferability of

study findings with the goal of providing an initial understanding of the phenomena of interest and their implications. Second, our survey was not implemented with a randomized sample of nursing students. While randomization helps to minimize bias and increase the generalizability of the results, it was not feasible in our study environment. We have made efforts to highlight the characteristics of our sample to aid in assessing external validity. Third, 51 survey respondents who did not complete the job attributes section were excluded from the main quantitative results. These nonrespondents were mostly younger students in earlier years of study. The views of third-year and fourth-year students may be more relevant for understanding the perspectives of prospective nurses, as they are closer to entering the job market. However, our findings may be less applicable to students in the earlier stages of their studies. Fourth, it is important to acknowledge that the study focused exclusively on nursing students. While this allowed for a specific examination of this group, it also means that the findings may not be applicable to other healthcare professionals or currently employed nurses. More research is required to investigate the experiences and perspectives of these additional groups.

Our study had several notable strengths. First, we successfully integrated qualitative results into the design of the quantitative survey, creating an integrated mixed methods study. Second, we used hypothetical job scenarios to eliminate biases that arise when analyzing actual job choices made by workers. Realized job choices can be influenced by employer preferences and job availability, rather than true worker preferences [20]. Third, this study aimed to pilot an approach for understanding healthcare professional preferences regarding workplace attributes in Canada. It could serve as the initial step towards gaining a deeper understanding of how continuing care workplaces can attract healthcare professionals. Despite being an initial step, this study should still provide valuable insights to employers in the continuing care sector.

5. Conclusions

Cross-sector wage competitiveness remains crucial for the continuing care sector to attract and retain healthcare professionals. However, this study emphasizes additional workplace attributes that employers in the sector should consider when recruiting and retaining prospective nurses. Employers should prioritize creating a flexible work environment that allows healthcare professionals, including registered nurses, to work to their full scope of practice. In addition, workplaces need to address the real and perceived risks of injury, abuse, and violence that influence labour market decisions. Nursing curricula and postsecondary faculty engagement in nursing education play a key role in addressing negative perceptions about the sector, which may be unintentionally reinforced by the current curricula (for example, relegating continuing care sector placement to initial practicum experiences). Nursing faculty should consider opportunities that explore the complexity of work in the long-term care sector. These may include simulations

focused on providing care to dementia patients [46], structured field experiences across programs with long-term care homes [47], and case studies that raise the nuanced and professional-based issues that are reflected in this paper (e.g., advocating for care standards and negotiating opportunities to work to full scope). Nursing education research is required in this area to demonstrate the effectiveness of these types of initiatives on student attitudes toward the sector. These efforts may expose nursing students to the positive aspects of working within the continuing care sector and with older adults while simultaneously working to dispel negative perceptions about the continuing care sector.

Data Availability

The qualitative and quantitative data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the publication of this paper.

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Supplementary Materials

The Supplementary Materials that are referenced in the study include: Appendix A: semistructured interview-focus group guide. Appendix B: online cross-sectional survey instrument. Appendix C: job attribute justifications. Appendix D: Table A1 results where the researcher (DR) compared the demographic characteristics of those included in the regression analysis to those who were excluded. (*Supplementary Materials*)

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Review Article

Practical Implications of the Organizational Commitment Model in Healthcare: The Case of Nurses

Mercedes Rodríguez-Fernández ¹, Juan Herrera ¹, Carlos de las Heras-Rosas ²,
and Antonio Manuel Ciruela-Lorenzo ¹

¹Faculty of Social and Work Studies, University of Málaga, Málaga, Spain

²School of Industrial Engineering, University of Málaga, Málaga, Spain

Correspondence should be addressed to Mercedes Rodríguez-Fernández; mmrodriguez@uma.es

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Background. In addition to the usual difficulty of managing human capital in any organization, healthcare institutions have other problems to solve arising from the circumstances and the very nature of the work they perform, such as the ethical pressure on staff, emotional exhaustion, the distribution of work shifts, or the general shortage for nurses. In many cases, this situation has an impact on the quality of care. **Objective.** The main objective of this research is to compile, in a single document, human resource practices that help health centre managers improve results in terms of performance and quality of care, as well as avoid the intention of abandoning the job, specifically related to the work of nurses. **Methods.** To this end, a systematic literature review has been performed based on 229 papers published in the Web of Science database, from which the practical implications for nurses proposed by these authors have been extracted. **Results.** The main results suggest that developing affective commitment helps to improve organizational performance and enhance patient safety culture. Furthermore, improving communication and meaningfulness of work, recognition by superiors, or job flexibility would improve the quality of outcomes, for the work of nurses. **Conclusions and Implications for Nursing.** Stimulating normative commitment, reducing excessive control, and paying attention to job burnout and job stress help combat the intention of voluntary turnover or leaving the job, especially in the case of nurses.

1. Introduction

Healthcare faces a considerable challenge regarding the management of human resources [1, 2]. The World Health Organization (WHO) has already remarked, in the WHO's World Health Report [3], the worrying shortage of staff and management difficulties in healthcare. More recently, the Sustainable Development Goals Report of the 2030 Agenda [4] warns about the lack and unequal distribution of staff in health institutions.

Human resource management (HRM) in the healthcare sector has become an arduous task for the managers of these institutions, as in addition to the usual problems that can arise in any organization, there are others derived from the type of work that is carried out [5, 6], such as shift work, care pressure, emotional exhaustion, and work ethic. In any

organization, it is essential that employees are aligned with the organizational goals, and in healthcare institutions, this aspect is even more important, as it is the healthcare professionals who are in direct contact with patients, and their involvement, empathy, and motivation will largely determine the quality of the medical care [7–9].

The singular characteristics of this sector have generated a great deal of research related to healthcare organizations [10, 11]. Amongst the approaches mainly employed, two main categories can be distinguished. On the one hand, the research describes specific cases of HRM in healthcare organizations in a particular location and subject to particular circumstances: Asian nurses in US hospitals [12], nurses in US hospitals [13, 14], Dutch cases [15, 16], Canadian staff nurses [17], and China's circumstances [18]. On the other hand, there is an investigation that addresses the different

factors considered in the conceptual model underlying this research [19], such as human resource management [9, 20], job satisfaction [21, 22], organizational commitment [23–25], staff turnover [12, 26], risk of burnout [27, 28], or insufficient availability of qualified nursing staff [10, 13, 29, 30].

Published research has described and developed these issues, linking them to different organizational factors such as managers' leadership styles [31, 32] or psychological contract fulfilment [33, 34]. The latter's link to organizational and professional commitment has also been analysed [25, 35], and other concepts such as trust, performance, or productivity emerge from it. In fact, organizational commitment (OC) is positioned as one of the most important elements in the management of human resources in healthcare [23, 36].

As can be seen, there are many factors and interrelationships in the management of human resources in healthcare institutions that are also present in other organizations, perhaps taking on greater importance in these due to their nature and circumstances.

Therefore, there appears to be a high level of interest in the subject and a significant production of literature; however, as far as the authors are aware, the analysis of OC in HRM in the health sector has never been addressed from a practical perspective. In this sense, the aim of this research is to bring together in a single document the practical implications resulting from the different techniques and dynamics of HRM in healthcare institutions in which OC plays an essential role. This research will help all managers understand what factors moderate the OC of their employees (particularly nurses) and how they affect the performance and quality objectives in their organizations. It also presents causes and possible solutions to avoid the negative consequences of low OC in institutions. We also believe that this publication will provide the scientific community with interesting insights into OC in healthcare institutions and with reference to the practical implications to be adopted, which can be a starting point for future research.

2. The Review

Organizational commitment (OC) can be described in terms of the personal benefit of the functions performed, the autonomy to perform the job tasks, and the strategic management assumed by the employees [37]. In particular, according to Fadillaha et al. [38], OC describes employees' willingness to accept organizational goals and to cope with work. In this way, it encompasses a series of behaviours that lead them to make efforts for the good of the institution, to accept its values, and to long for permanence in the institution [39]. In this sense, Sena [40] goes a step further and incorporates aspects such as the desire to work well for the organization and have the pride of belonging to it.

Based on the above, and despite the existence of contrasting theories on OC [41–48], it can be observed that most authors agree with the three components proposed by Meyer and Allen [49, 50], i.e., continuance commitment, affective

commitment, and normative commitment. These postulates are positioned as the starting point of this research; it is considered that OC is a key element in the achievement of objectives by organizations. This approach motivated us to explore the practical implications of achieving OC in healthcare organizations. Continuance commitment is based on the embeddedness caused by small investments that have developed over time [51]. Affective commitment is linked to psychological rewards such as recognition or support shown by peers that lead to identification with the organization and acceptance of its values and goals [52]. Finally, normative commitment relates to the worker's own values and his or her responsibility for his or her workplace ethics [51]. In this sense, Top et al. [53] highlight the importance of affective and normative commitment in the development of organizational trust, also highlighting the need for further research in this area.

Ultimately, organizations must have committed members if they are to thrive or even survive [54], and to this end, HRM activities have the potential to influence an employee's level of OC and, consequently, their retention [55]. This is valid in all areas and fields of activity. In healthcare, continuance commitment is considered one of the critical aspects due to the high turnover of staff, finding several types of research that related HRM to OC [56, 57]. Thus, Mousa and Puhakka [58], in the Egyptian setting, delved into the relationship between responsible leadership and organizational inclusion, concluding that an environment of respect, equality, and fairness in the workplace contributes positively to the development of affective, normative, and continuance commitment of physicians. Conversely, Ramoo et al. [59], in the Malaysian setting, established that there is a direct relationship between age and continuance commitment of nurses, although it also depends on external factors such as labour market opportunities.

Affective commitment also has a clear particularity for healthcare as it is positively related to job satisfaction and trust in the organization [16]. In that sense, Shipton et al. [9], in the context of several Dutch hospitals, argued that by performing roles that evoke deeply held values, such as excellent patient care and concern for others, line managers can have a positive effect on staff attitudes.

Furthermore, normative commitment has also been extensively addressed in the healthcare literature, where it is related to various aspects such as demographics, gender, background, age, and type of institution. In this sense, Gambino [60] established that the strongest indicator of the intention to remain in the position of nurses is normative commitment, which is also reinforced in the function of the age of the workers; he therefore recommends promoting normative commitment in younger nurses.

Finally, also in relation to OC, Rodríguez-Fernández et al. [19] proposed a model that explained the effects of OC on healthcare institutions (Figure 1). They argued that, from a transformational leadership approach, OC becomes fundamental to achieve the high levels of performance and quality required in health-related workplaces. For this reason, they placed it in a central place amongst the aspects to be taken into account for the achievement of the

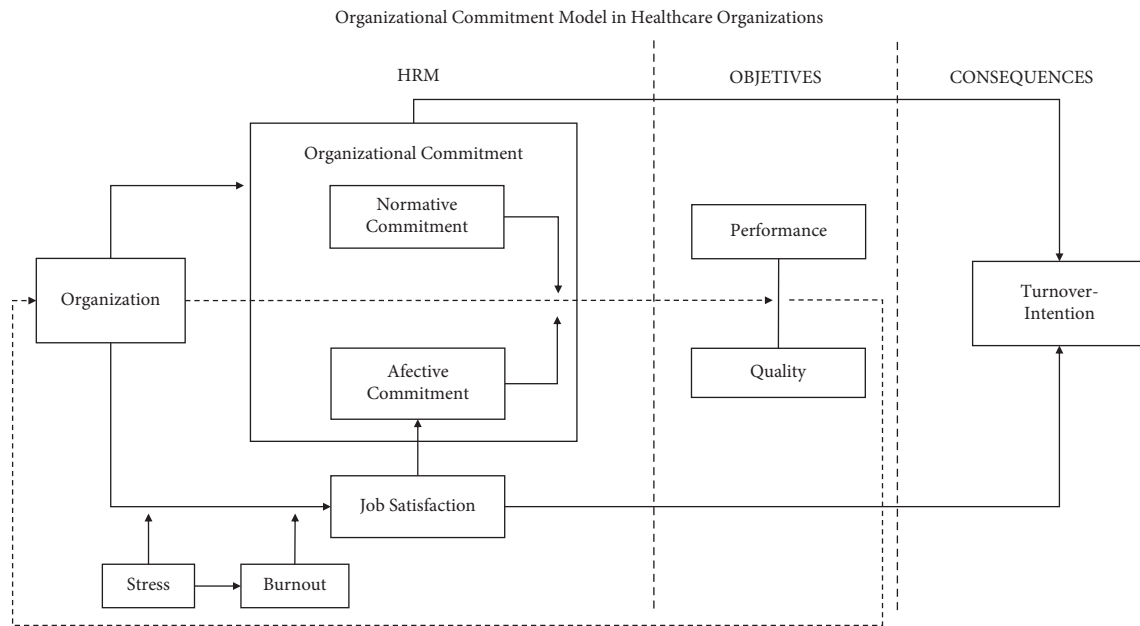


FIGURE 1: Model of organizational commitment. Source: Rodríguez-Fernández et al. [19].

objectives of these organizations. Another important aspect is job satisfaction, which is postulated as the main factor for improving OC, both normative and affective, and, in turn, avoids negative consequences such as the intention to leave the job. Similarly, certain moderating factors such as stress and burnout directly attack job satisfaction, negatively influencing it and thus OC, jeopardising the achievement of key objectives in healthcare institutions such as high performance and quality service to patients.

The model in Figure 1 provides an essential reference point to guide the process of this research. The systematic literature review undertaken represents a significant contribution to the study of OC in the context of healthcare organizations. This review brings together the range of practical implications detailed in previous research, comprehensively addressing all relevant factors that are usually dealt with individually. Other literature reviews on this topic have been developed previously. These include the longitudinal study by Freese et al. [33] on the impact of organizational changes on psychological contracts; the systematic review by Lu et al. [30] on job satisfaction of hospital nurses; the longitudinal study on OC and mental health [61]; or the systematic review on burnout syndrome in nurses [62]. No reviews have been previously found on the practical implications related to OC in healthcare institutions.

3. Methods

A systematic literature review of a sample of publications from the Web of Science (WoS) database has been carried out. To find a cause-effect relationship between OC and the objectives and consequences in healthcare organizations, the “model of organizational commitment” by Rodríguez-Fernández et al. [19] has been used.

3.1. Materials. The study has followed PRISMA 2020 guidelines for screening, selection, extraction, and data acquisition [63]. The search strategy is detailed in Figure 2, which explains the step-by-step process.

The documents analysed came from the Web of Science (WoS) database. The filters were established according to the criteria of the participants. The first restriction applied was the publication deadline, which was set to 31 December 2023. A preliminary scan was carried out to find the words that best represented the object of study. Publications containing these words in the title, abstract, author keywords, and keywords plus were filtered. For this, the following formula was used: (“organizational commitment” or “organizational commitment”) and (“health institutions” or “health system” or “healthcare” or “healthcare” or “health”). The search was restricted to the following indexes: Science Citation Index Expanded (SCI-EXPANDED), Social Science Citation Index (SSCI), Emerging Sources Citation Index (ESCI), Art and Humanities Citation Index (A&HCI), Conference Proceedings Citation Index-Social Science and Humanities (CPCI-SSH), Book Citation Index (BKCI), and Science Citation Index Expanded (CCR-EXPANDED). The year of publication was not limited, for the purpose of having the largest number of publications associated with this subject. To include the most recent publications that have not yet achieved the corresponding scientific impact, the number of citations received was unrestricted.

As a result of the search, a total of 559 manuscripts were obtained from WoS. After this first selection, the authors, individually, proceeded to discard those publications whose subject matter did not correspond to the purpose of the research or which, although of interest, did not provide practical implications related to OC in healthcare institutions. By using unique WoS, no duplicate papers were detected. A total of 275 documents were extracted from this

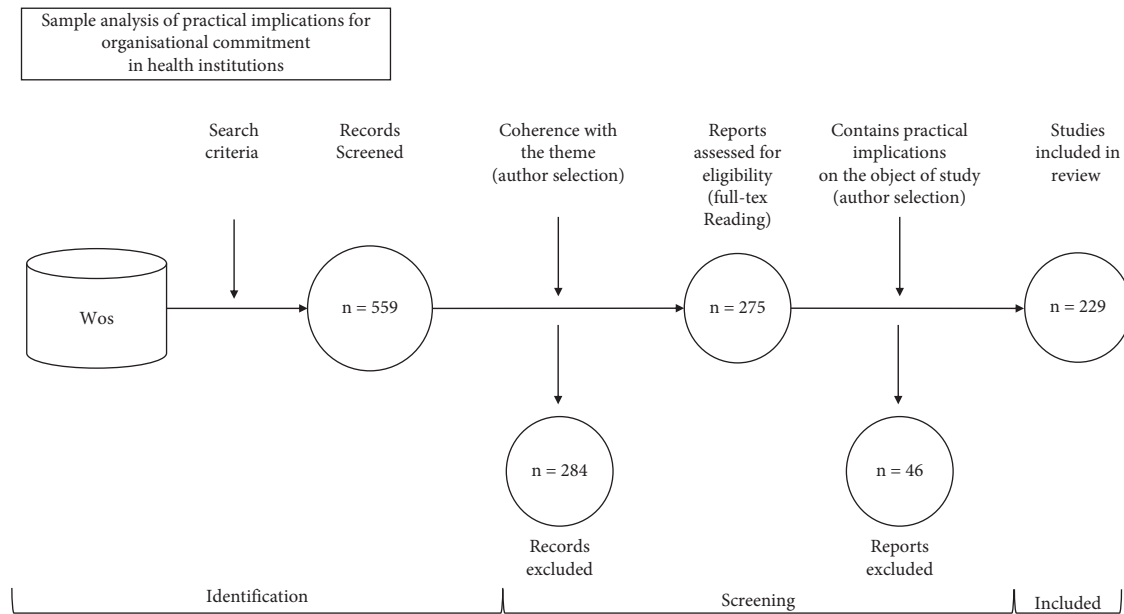


FIGURE 2: Sample analysis of practical implications for organizational commitment in health institutions and flowchart based on PRISMA 2020. Source: prepared by the authors. WoS (Web of Science).

first filter. Subsequently, the authors applied a second filter to extract those documents with practical implications, in line with the model used in this research—“model of organizational commitment” by Rodríguez-Fernández et al. [19], resulting in a sample of 229 documents (Figure 2). In the application of both filters, all authors agreed on the same number of excluded papers. Finally, the ATLAS.ti version 9 application was used for the literature review. This tool allows for the organization and categorization of large volumes of textual data, as well as, through the coding and development of the themes, the thematic analysis [64].

4. Results

The practical implications identified under each of model’s headings are detailed as follows.

4.1. Organizational Commitment. In terms of works related to organizational commitment, 78 papers have been found. Amongst practical implications that have a general impact on OC, the following stand out: (a) when nurses in managerial positions are seen by their teams as effective and trusted transformational leaders, there is an improvement in their commitment to the organization, as well as an increase in worker effectiveness and productivity [65]; (b) the design and implementation of strategies and practices in HRM foster OC, which in turn improves well-being, happiness at work, and performance within the organization [66]; (c) in addition to the intrinsic needs of workers, the quality of the physical infrastructure and work environment are key factors in increasing OC [67]; and (d) nursing managers should take measures to reduce workload and improve remuneration and job autonomy to enhance OC [68].

Publications with practical implications related to affective commitment have highlighted the following issues: (a) increased affective commitment implies growth in job performance [69], and for the case of nonprofit organizations, it is also considered a key factor [70]; (b) increased affective commitment increases patient safety culture [71]; (c) it has been detected in organizations that high levels of affective commitment hinder the occurrence of job burnout [72]; and (d) employee training and development has a moderating effect on the growth of affective commitment [15].

With respect to normative commitment, the results suggest that (a) with regard to turnover intention, in the case of nursing jobs, improving job quality helps to avoid resignations [73]; (b) with regard to improving levels of *normative commitment*, and generating greater commitment, it is necessary to foster loyalty and obligation in healthcare settings and nursing schools [60]; and (c) in relation to the performance of healthcare staff, Gorgulu and Akilli [74] suggest that there is a positive and significant relationship between levels of normative commitment and job satisfaction displayed by workers, indicating how efforts made to reduce job burnout and psychologically supportive dynamics will improve motivation to provide better care.

It is noteworthy that another type of commitment analysed in the theoretical model, continuance commitment, has not been reflected in specific practices in the context of healthcare and no evidence of proposals or practical experiences has been found.

4.2. Moderating Factors: Job Satisfaction, Stress, and Burnout. The sample of publications presenting practical implications related to moderating factors such as job satisfaction, stress, and burnout consists of 45 papers. There has been a great proliferation of research focused on nurses. Suggestions [75]

recommend that nurse executives support collegial solidarity in healthcare settings, in particular, by reducing stress, strengthening teamwork and communication, and thereby making the organizational climate more positive. In the study conducted by Tourigny et al. [76], moderating factors are highlighted for their practical importance for healthcare in general and for nurse management in the case of Japan and China in particular. Similarly, nurses' job satisfaction could be increased by promoting organizational and professional commitment and reducing occupational stress, role conflict, and role ambiguity [77]. In this sense, the authors in [78] adds, in the case of paediatric nurses, that, in addition to the above, it is necessary to provide support to alleviate turnover intention. Additionally, Perez [79] points out the significant cost of the loss of knowledge when employees decide to leave. In summary, burnout must be combated through interventions [80].

Furthermore, nurse managers should support burnout management with the provision of psychological employment [81] and practice responsible leadership by promoting a culture of inclusion [82]. Organizational culture should be geared towards prioritising workers' mental health, which requires improving communication skills and proactively engaging with teams to set and address wellness goals [61]. Burnout prevention plans, with a focus on social support, should be developed to improve nurses' quality of life and increase the care they provide [62]. Fragoso et al. [83] propose the reduction in work demands to prevent burnout, while Tripathy et al. [84] and Babatope et al. [85] suggest the enhancement of work-life balance practices, reduced burnout, and support from supervisors to increase job satisfaction. Management strategies that empower nurses for professional practice may be helpful in preventing workplace incivility and ultimately burnout [86]. Structural empowerment generates positive workplace outcomes; these outcomes relate to increased job satisfaction, increased OC, adoption of innovative behaviours, and reduced burnout and turnover [18, 87, 88]. Recently, Khatatbeh et al. [89] performed a systematic review and critical analysis of measures used to evaluate nurses' burnout and quality of life. Finally, applying resonant leadership in healthcare organizations can reduce employee burnout and prevent stress-related illnesses. It is also associated with a greater sense of belonging and OC [90].

4.3. Objectives: Performance and Quality. In the organizational commitment model that serves as the structure of this research, the organization's objectives focus on achieving high levels of performance and quality of care. A total of 35 papers have been analysed, which, in generic terms, try to apply HR practices that foster communication, work significance, and appreciation of superiors in order to increase OC and consequently the quality of services [91, 92].

In particular, it is recommended that managers and policy makers develop and implement supportive and nurturing strategies that improve organizational culture (emotional climate and collaborative relationships), which should lead in a reasonable time to more positive perceptions of the quality of healthcare [93, 94]. It is also suggested

by Khera et al. [95] that health centres should measure performance in terms of the implementation of programmes that detect financial difficulties.

An imperative objective, according to Attia et al. [96], is to create a positive environment in intensive care units (ICUs) to increase staff satisfaction and efficiency by promoting quality of care, with special attention to junior staff.

Nurses also have a very important role in the analysed documents as a majority of authors consider them a stakeholder group on which management improvement should be focused. In particular, the proper establishment of work shifts is considered a measure of OC that would result in better performance of the nurses [97].

Nevertheless, managers should conduct professional training courses for nurses to improve the quality-of-service delivery [98]. In particular, the main implications for nursing education and practice are that educators and clinical mentors should work collaboratively to bridge the gap between theory and practice, thereby improving the quality of the clinical experience of these students, as proposed for China and elsewhere [99].

Along the same line, Hsu and Kernohan [100] recommend further research with different groups of nurses in a wider variety of work settings to examine the strengths and weaknesses of nurses and to develop appropriate strategies for the quality of their working lives. Research could seek to obtain objective measures of nurse performance rather than self-report measures [101].

4.4. Implications for Nursing and Health Policy. The consequences of the proposed model, considering its practical implications, are mainly based on improved performance, job satisfaction, and reduced turnover [102]. Some authors refer to structural empowerment leading to positive workplace outcomes such as increased satisfaction, greater commitment, adoption of innovative behaviours, and reduced burnout and turnover [87].

Organizations that need to adapt to changing environments should implement a strong employability culture, because such stimulates employability orientations amongst employees and, at the same time, decreases turnover intentions [103]. Monitoring and adopting measures that eradicate the experience of threats or violence by workers, as well as exposing physicians to less control over the pace of work, can prevent turnover intentions [104]. Workplace discrimination is associated with physicians' job turnover, career dissatisfaction, and contemplation of career change [105].

As regards nurses, it is important to pay attention to nurses' job burnout and job stress to improve job satisfaction and OC and to provide support to alleviate turnover intention [78]. Awareness of flexible work systems, OC, and quality of life needs to be reflected in interventions to reduce the turnover intention of health nurses [106]. It has been shown that healthcare organizations with greater investments in their nursing human capital are more likely to demonstrate lower levels of turnover of their registered nurses [107]. This has been corroborated by a recent mapping study on nurses' changing work practices performed by Salma and Waelli [108].

As for nurse leadership, authors such as Dahinten et al. [17], Alkarabsheh et al. [14], Lei et al. [109], or Orłowska and Laguna [110] assert that they should utilise a variety of organizational, structural, and psychological empowerment strategies that are important for their job satisfaction and potentially for the quality of patient care and turnover. Finally, as pointed out by Cooper-Thomas and Poutasi [111] and Rodríguez-Fernández [112], it is necessary to adequately adjust the person-position-organization triangle, which is key to avoid the intention to leave the organization.

5. Discussion

This study explores the influence of organizational commitment on performance and quality of care in healthcare settings, with a specific focus on nurses. It discusses the practical implications found in a systematic literature review, which suggests that effective OC can significantly improve both nurses' well-being and patient care outcomes.

The findings highlight that transformational leadership, effective communication, and recognition by superiors are essential to foster OC. Therefore, human resource management in the health sector becomes a challenging task for managers in these institutions. In these cases, employees must be aligned with the goals of the organization, as healthcare professionals will largely determine the quality of the healthcare provided [7–9].

Noteworthy, the present research demonstrates that there are numerous factors and interrelationships between human resource management and healthcare, something also reflected in previous studies [31–35].

In the organizational commitment model that serves as the structure for this research (Figure 1), the organization's objectives focus on achieving high levels of performance and quality of care, and OC is positioned as a key aspect, which is supported by research. These aims indicate that, in generic terms, HRM practices that promote communication are applied to increase CO and service quality [91, 92].

Numerous publications with practical implications related to affective commitment have been found to highlight its positive relationship with job performance [69] and an increase in patient safety culture [71]. This relationship becomes inverse in relation to occupational burnout [72]. However, employee training and development have a moderating effect on the growth of affective commitment [15].

Regarding normative commitment, and in line with the analysis conducted, there is a positive and significant relationship between levels of job satisfaction and the former [74]. This leads to improved job performance and low levels of turnover intention [73], so it seems advisable to foster loyalty and commitment in both healthcare settings and nursing schools [60, 113].

No evidence has been found in continuance commitment of proposals or practical experiences to promote this type of commitment. It should be noted that in the model on which this study is based [19], continuance commitment did not appear as representative, which confirms its correct approach.

The studies analysed indicate that transformational leadership, HRM practices, and both intrinsic and extrinsic factors have a positive impact on increasing CO. In particular, when nurses in managerial positions are perceived by their teams as effective and trusted transformational leaders, an increase in staff efficiency and productivity is observed, as well as an improvement in their commitment to the organization [65]. Furthermore, the implementation of HRM strategies and practices not only fosters OC but also improves well-being, happiness at work, and overall performance. Factors such as the intrinsic needs of workers, the quality of the physical infrastructure, and the work environment are key elements in increasing CO [67, 68].

Regarding job satisfaction, burnout, and stress as moderating factors, the results agree with Green et al. [80], who state that it is crucial to combat them with specific interventions. According to Tripathy et al. [84] and Babatope et al. [85], improvement of work-life balance practices and support from supervisors can increase job satisfaction. Velando-Soriano et al. [62] point out that burnout prevention plans with a focus on social support should be developed, which will improve nurses' quality of life and, consequently, the care they provide. Furthermore, the application of resonant leadership in healthcare organizations can decrease employee burnout and prevent stress-related illnesses [90].

Finally, the effective implementation of human resource practices aimed at promoting CO, and thus improving the quality of patient care and reducing the turnover rate of healthcare staff, shows significant variations between different healthcare settings. These differences are largely dependent, for example, on whether the health institution is publicly or privately owned, as well as on the geographical and cultural context in which it is located. In this regard, it is observed that nurses in the private sector and in rural areas more frequently consider leaving their posts compared with those working in the public sector and urban areas [66, 114]. Resource-constrained environments, however, create barriers that include shortages of skilled personnel, inadequate infrastructure, and limited access to continuous training [67, 115]. These barriers can negatively affect the implementation of HR practices aimed at fostering OC. In more developed contexts where resources are not a significant constraint, the challenges focus more on resistance to change and institutional bureaucracy [116]. In these environments, despite the availability of resources, rigid policies and lack of flexibility may impede the adoption of new HR practices that are essential to improve CO and, consequently, quality patient care. Therefore, to overcome these challenges, it is essential that HR interventions are designed and adapted considering the specific characteristics of each healthcare setting.

5.1. Practical Implications. The concept of organizational commitment amongst nurses has been studied in various hospitals, with a focus on its impact on healthcare quality and patient safety. In Mexico, a study on the dominant culture amongst nurses in a public hospital revealed the need

for consensus on values, attitudes, and behaviours to strengthen and develop hospital organizations [117]. In Catalunya, Spain, a study on nursing governance and its impact on perceived quality showed a positive correlation between patient satisfaction and safety with the work of nurses and their commitment to the organization [118]. In the United States, research has explored the relationship between work engagement, burnout, and organizational commitment amongst nurses, with findings suggesting that job crafting and work engagement can mediate the relationship between participation in decision-making and intentions to leave the organization [119]. In Brazil, a study on leadership in intensive care units found that the relationship between nurses and doctors was more favourable in public hospitals with a more collaborative leadership style [120]. These studies highlight the importance of fostering a positive organizational culture and commitment amongst nurses to improve healthcare quality and patient safety.

5.2. Other Studies on Healthcare in Addition to Nursing.

In addition to research on the organizational commitment of nurses in healthcare institutions, the literature has also addressed other healthcare-related work sectors, mainly physicians. Leadership behaviour has been shown to have a positive influence on the organizational commitment of physicians [121, 122], a finding that coincides with the results presented in this study for nurses. Research by Gokce et al. [123] related to the organizational commitment expressed by physicians in public and private healthcare providers is consistent with the results of our research, which show that there are a positive and significant relationship between perceived organizational support and affective and normative commitment and an insignificant relationship between perceived organizational support and continuance commitment.

However, there are also some differences in relation to the factors that enhance OC in doctors and nurses. Individual support from leaders and colleagues is positioned as elements that most positively influence the OC of physicians, while nurses improve their OC when they increase their degree of autonomy and do not feel overly monitored or overwhelmed at work [124, 125]. In summary, research shows that physicians have lower levels of CO than other health professionals, influenced by more work-related aspects, employment, and age [125].

5.3. Limitations and Future Research. As concerns the limitations of the present work and further research, we have delved into human resource practices in the health context, with a particular focus on nursing. However, it is necessary to recognise that our findings have inherent limitations. For instance, sector specificity may limit the generality of the findings to other contexts or populations. Furthermore, the use of additional databases could give as a result a larger number of papers. Furthermore, bibliographic bias could arise due to not using certain sources, Scopus, for example, which could lead to over-reliance on a particular perspective or ignoring relevant research that could challenge the

assumptions of the study. However, the WoS database is highly valued in the scientific community due to its exhaustiveness and quality in indexing high-impact scientific journals in various disciplines.

In general terms, for future research it would be of interest to (1) study how the relationships between professionals and teams in healthcare impact key factors on organizational commitment and (2) apply the model used in this article to other healthcare groups for a holistic approach. Based on the results of this work referring to OC in future research, we will be able to follow up on new publications where nursing management is crucial in improving health. Regarding affective commitment, future research can be enriched with works that analyse the effects of its growth on patient safety, burnout occurrence, and the moderating effect of nurses' training and development. Regarding normative commitment, future research will analyse the relationship between nurses' job satisfaction and their improvement in daily motivation.

Finally, the inclusion of Magnet hospitals in the study of the applicability of this model can result in interest for an upcoming paper as these types of organizations present, amongst other benefits, better work environments, higher nurse job satisfaction, less burnout, and decreased intent to leave [126].

6. Conclusions

As noted above, this paper applies a previous theoretical model on organizational commitment in healthcare to the case of nurses.

The increase in OC is positioned as a key factor in achieving the objectives set by organizations, an effect that becomes even more transcendental in healthcare institutions. In the systematic review of the literature related to practical implications, the relevance of the high status of nurses, the importance of adequate human resource management, and the convenience of adequately covering the intrinsic and extrinsic needs of workers have been highlighted. Appropriate workload management, remuneration, and autonomy are also positioned as good practices to improve CO.

Organizational commitment can be divided into affective, normative, and continuance commitment. In the 229 articles analysed, there is little presence of practices related to improving continuance commitment. However, issues related to affective and normative commitment are sufficiently represented.

Affective commitment is the most present in the research and is positioned as key in nonprofit and healthcare organizations. It helps improve patient safety culture and decreases the occurrence of burnout, amongst other effects. Employee training and development have moderating effects on this commitment. It can be added that affective commitment implies an increase in job performance, specifically for the work of nurses.

To enhance normative commitment, loyalty and obligation need to be fostered in healthcare settings and schools. Job satisfaction favours normative commitment; hence,

leaders should orient their human resource policies to reduce job burnout, encourage communication, increase flexible working hours, avoid excessive control, and, in short, generate a suitable environment for performance.

Job satisfaction, stress, and burnout are presented as moderating factors in achieving high levels of commitment. The authors highlight how these elements become more important in jobs related to healthcare in general and nursing work in particular, mainly due to the importance of the loss of knowledge when an employee decides to leave, and the negative influence that inadequate human resource management can have on patient care.

Health organizations aim to improve their performance levels and quality of care. HR practices for nurses that foster communication, job satisfaction, appreciation of superiors, and appropriate work environment will provide higher levels of CO, which will result in increased recognition of the work and improved patient care.

Data Availability

This study has followed PRISMA 2020 guidelines for screening, selection, extraction, and data acquisition. The documents analysed came from the Web of Science (WoS) database.

Ethical Approval

There are no ethical issues related to this research. No humans or animals have been used to carry out the work under study in this article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Predicting New Graduate Nurses' Retention during Transition Using Decision Tree Methods: A Longitudinal Study

Taewha Lee ¹, Yea Seul Yoon ², and Yoonjung Ji ^{1,3}

¹Mo-Im Kim Nursing Research Institute, College of Nursing, Yonsei University, Seoul, Republic of Korea

²College of Nursing, CHA University, Pocheon, Republic of Korea

³Brain Korea 21 FOUR Project, College of Nursing, Yonsei University, Seoul, Republic of Korea

Correspondence should be addressed to Yoonjung Ji; jiyoonjung0113@gmail.com

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Background. Although retaining new nurses is imperative for the future of the nursing profession, it remains a challenging task in the healthcare industry. Understanding the career journey of new graduates as they transition from students to nurses is vital. However, longitudinal studies investigating the factors influencing retention during this period are lacking. **Aim.** The aim of this study is to identify the influencing factors and develop a longitudinal prediction model for new graduate nurse retention. **Methods.** A secondary data analysis was conducted using the New Nurse e-Cohort Study dataset from two survey periods, November–December 2020 and February–March 2022. The participants were categorized into either retention or turnover groups based on their turnover experiences. A decision tree based on classification and regression tree (CART) analysis was utilized. **Results.** Of the total 586 participants, 463 (79%) were in the retention group. The CART model highlighted that new nurses' retention was significantly associated with younger age, higher readiness for practice (clinical problem-solving) during the nursing program, lower transition shock (such as confusion in professional values, loss of social support, and conflicts between theory and practice), and a higher person-environment fit (person-job fit). The predictive accuracy of the CART model was 79.7%. **Conclusion.** To retain new nurses, nursing educators and hospital managers should collaborate to prepare nursing students for actual practice, offer support during organizational socialization, and foster healthy professional values for competence in the workplace. **Implications for Nursing Management.** Transforming the educational strategies of nursing programs and hospital management policies is imperative to ultimately enhance the retention of new graduate nurses.

1. Introduction

Accounting for over 50% of the global health workforce, there are approximately 28 million nurses worldwide [1]. New and experienced nurses are essential to the profession's future, but retaining them within the healthcare industry continues to be challenging. As a result, by 2030, there is expected to be a shortage of 5.9 million nurses [1], leading to a vicious cycle of far-reaching consequences on patient ratios, staff dissatisfaction, occupational stress, burnout, and staff retention issues, ultimately compromising patient safety and the quality of care [2, 3]. Turnover is especially a problem among new graduate nurses; up to 30% and 57%

leave within their first year and by the end of their second year, respectively [4]. New nurse turnover represents a loss of human and financial resources for the healthcare workforce, which is particularly problematic given the prevailing global shortage of nurses [5]. Preventing the exodus of new nurses is crucial; specifically, it requires developing an understanding of how new nurses adapt to new roles, from students to nurses [6], the reasons for the exodus, and multifaceted solutions to prevent it.

The first year of employment is the period for nursing students to grow and adapt as competent professional nurses. The successful transition to practice is an important factor that determines the retention of new nurses [7].

During the transition, new nurses confront numerous challenges, such as a theory-practice gap, overwhelming workload, difficulties in interpersonal adaptation with co-workers, confusion in professional identities, lack of nursing competency [8], and work-life imbalance [8, 9].

Previous studies have contributed to understanding the diverse factors related to the reasons for new nurse turnover and recommended policy strategies to retain them in practice. New nurses' turnover reasons appear to increase in a poor working environment [10, 11] and when nurses experience workplace bullying [12] or violence [13]. In addition, low resilience with less empowerment [11], low job satisfaction [13, 14], and high job stress [15] provoke high turnover intention. However, as previous studies focused on the relationship between these factors and turnover intention rather than actual turnover, there is insufficient evidence to determine whether the reported factors really predict nurse turnover in practice settings.

Focusing on the factors leading to the retention of new nurses is more effective than identifying the factors involved in turnover; a positive approach not only controls problems but also goes beyond elimination and leads to a healthy work environment and better work life quality in the nursing profession [16]. In addition, identifying and enhancing retention factors can create a positive organizational environment that encourages new nurses to continue to work, leading to improved quality of nursing and patient safety [17]. Brook et al.'s systematic review [18] indicated that interventions aimed at retaining new nurses, including residency programs [19] and transition programs [20], have been relatively successful. However, the duration for intervention effects to manifest, ranging from 27 to 52 weeks, is relatively long, and sustaining the intervention during this period requires additional staffing and resources [18]. This raises doubts about the feasibility of implementation in countries with limited resources and support. In fact, out of the 53 studies included in the abovementioned systematic review, 52 were conducted in high-income countries such as the USA, Australia, the UK, and Canada [18].

Other descriptive studies have identified several organizational and personal factors that positively affect the retention intention of new nurses, including organizational culture, empowering leadership, organizational socialization [21], the meaning of work, organizational commitment, professional self-image [22], clinical competency, and grit [23]. To ascertain the factors influencing the actual retention of nurses, it is necessary to confirm whether retention intention translates to actual retention. Yet, similar to studies on nurse turnover, most nurse retention studies have identified a relationship between relevant factors and retention intention, not actual retention [24, 25]; thus, whether the factors affecting retention intention also affect retention is unclear. Therefore, to address the global nurse shortage, it is imperative to identify universally applicable factors influencing the retention of new nurses and formulate appropriate strategies [26].

Despite knowledge of their importance, the factors influencing the retention of new nurses have rarely been studied longitudinally. Most previous studies have focused on the experiences of new nurses after employment using

cross-sectional data [5, 8, 27], thereby limiting their predictive abilities. To understand the retention factors of new graduate nurses, their transition from students to nurses should be examined using longitudinal data. A previous study reported in-depth results by longitudinally analyzing the factors affecting the transition shock caused by the conversion of students into practicing new nurses; however, whether these factors eventually lead to the retention of new nurses has not been confirmed [6].

Therefore, we aimed to identify the factors influencing new graduate nurse retention, utilizing decision tree analysis to uncover the following two key aspects: the anticipatory socialization factors of nursing students and the organizational socialization factors of new graduate nurses based on Scott's 2008 model of new graduate nurses transitioning into the workplace [28] (Figure 1).

1.1. Conceptual Framework. The model proposes that anticipatory and organizational socialization experiences concurrently influence the successful transition of new nurses into the workplace [28]. According to this model, the transition of new nurses into the workplace is characterized by the following three phases of progression: anticipatory socialization, organizational socialization, and socialization outcomes. Anticipatory socialization refers to the educational or personal characteristics of a student who is preparing to start work as a nurse, such as age, gender, and educational preparation. Organizational socialization refers to all experiences that new nurses have after beginning work, such as work stressors, preceptorship, orientation, and person-environment fit. Socialization outcomes refer to negative or positive outcomes depending on new nurses' perceptions of practice, the organizational education program provided, personal conditions, and work environment. Dissatisfaction with work and career can lead to turnover, while satisfaction leads to retention.

2. Materials and Methods

2.1. Study Design and Data Source. A longitudinal study was conducted using the datasets of the first and second surveys of the New Nurse e-Cohort Study [29] in South Korea (Figure 2). The New Nurse e-Cohort Study is a longitudinal panel study that tracks senior nursing students for three years to identify factors influencing the successful transition to new nurses. The panel was constructed in 2020, with the second and third surveys conducted in 2022 and 2023, respectively. The data for the first survey were collected from November to December 2020, when all participants were senior nursing students. The data for the second survey were collected from February to March 2022, the year after the participants had graduated. The second survey was conducted when participants had experience working as new graduate nurses.

2.2. Study Sample. We included 637 (75.6%) participants out of 842 senior nursing students aged 20–29 who were scheduled to graduate in 2021 and take the national nurse

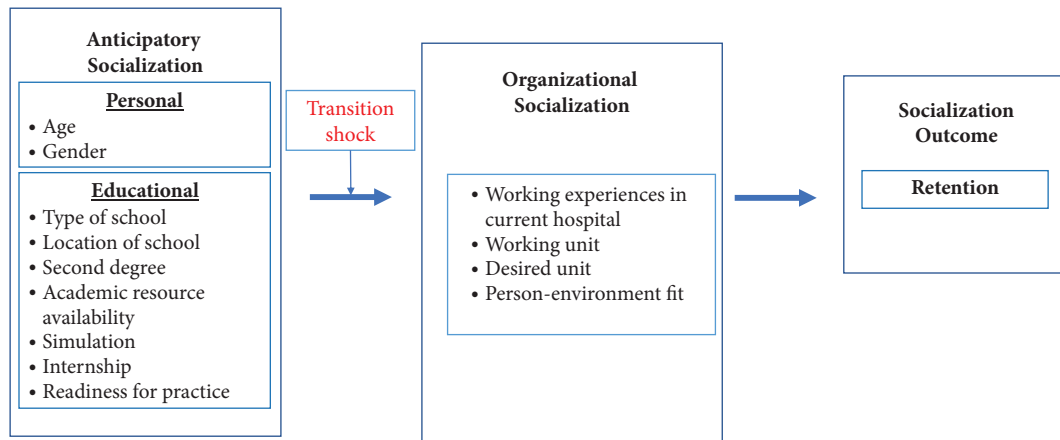


FIGURE 1: Conceptual framework to predict retention among new nurses based on Scott's model (2008) of the transition of new graduate nurses into the workplace.

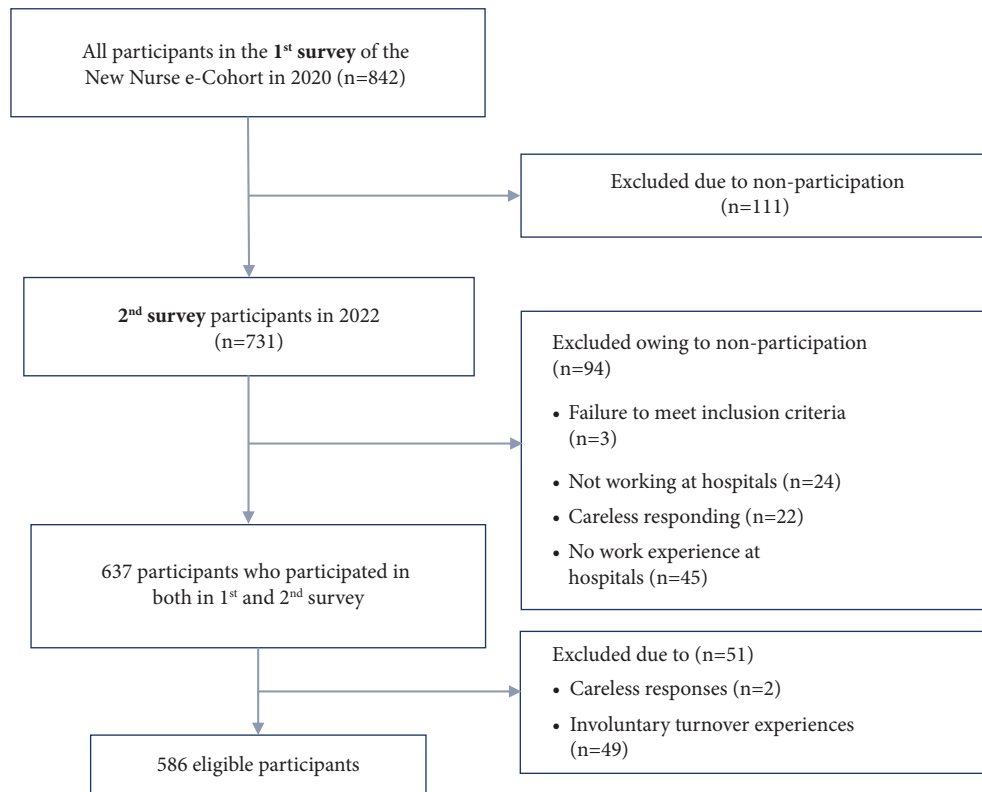


FIGURE 2: Flow diagram of participant selection.

licensure examination that year and who reported having worked in hospitals at the time of the second survey in 2022. Among them, 586 were included in the final analysis after excluding 49 with involuntary turnover experiences and two with careless responses. In the original study [29], additional consent for secondary data analysis was requested at the time of initial data collection, and only the data of participants who agreed to secondary data analysis were used in this study.

2.3. *Measurements.* Factors affecting retention were allocated to one of two categories based on Scott's model [28].

2.4. *Anticipatory Socialization*

Personal factors included participants' demographic characteristics (age and gender).

Educational factors included information related to the participants' prelicensure nursing education, including

the type and location of the school, second degree program, internship experience, availability of academic resources, and simulation education. Academic resource availability was measured by asking one yes/no question as follows: “have you been able to use any materials from the school library?” Simulation education was measured by asking another yes/no question as follows: “have you received simulation education?” Readiness for practice was assessed using the comfort and confidence section of the Casey-Fink Readiness for Practice Survey [8]. This self-report questionnaire consists of 20 items divided into the following four subscales: clinical problem-solving, learning techniques, professional identity, and trials and tribulations. Participants rated each item on a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree). The average score across all items is used as the scale score, where a higher score indicates greater readiness for practical application. Cronbach’s α was 0.69 at the time of the instrument’s development [8] and 0.83 in our study.

2.5. Organizational Socialization. Organizational socialization included information related to the first job experience at a hospital after graduation, including work characteristics (number of months worked, working unit, placement in desired unit, and number of preceptors), transition shock, and person-environment fit.

2.5.1. Transition Shock. Transition shock was measured using the Transition Shock Scale for newly graduated nurses [30]. This 18-item self-report questionnaire contains the following six subscales: conflict between theory and practice, overwhelming workload, loss of social support, shrinking relationships with coworkers, confusion in professional nursing values, and incongruity in work and personal life. The items are rated on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The mean of all items is considered the scale score, with a higher score indicating higher transition shock. Cronbach’s α was 0.89 at the time of the instrument’s development [30] and 0.89 in our study.

2.5.2. Person-Environment Fit. Person-environment fit was measured using person-job and person-organization fit perception scale [31]. This eight-item self-report questionnaire contains the following two subscales: person-job and person-organization fit. The items are rated on a 5-point Likert scale ranging from 1 (very little) to 5 (very large extent). The mean of all items is considered the scale score, with a higher score indicating better person-environment fit. Cronbach’s α was 0.86 at the time of the instrument’s development [31] and 0.89 in our study.

2.6. Socialization Outcome

2.6.1. Retention. Retention of new graduate nurses was assessed using a self-report questionnaire developed by our research team; during the second survey, participants were

asked if they had experienced a voluntary change in workplaces since the first survey. Depending on their answers, the participants were divided into retention and turnover groups.

2.7. Ethical Considerations. This study adhered to the guidelines outlined in the Declaration of Helsinki [32], and approval to conduct a secondary data analysis was obtained from the Institutional Review Board of Yonsei University Medical Center (approval no: 4-2023-0854). All data were anonymized before being shared with the research team.

2.8. Data Analysis. The descriptive characteristics of the sample were computed using means and standard deviations for continuous variables and frequencies for categorical variables. Differences between the retention and turnover groups were assessed by *t*-tests and χ^2 tests. Statistically significant variables ($p < 0.05$) in the univariate analysis were entered into the multivariate logistic regression analysis to develop the decision tree model. Decision tree analysis is a machine-learning technique [33] that provides a sequential and hierarchical path to an outcome variable from independent variables and demonstrates the retention probability given the specific values of the independent variables in the path. A decision tree based on classification and regression tree (CART) analysis was used to investigate the factors related to the retention of new graduate nurses. CART is an explanatory technique used mainly to identify data structures by splitting the data into segments that are as homogeneous as possible with respect to the dependent variables [34]. A classification model was constructed from the entire sample to create the largest tree structure with a minimum of 100 and 15 parent code and child node samples, respectively. K-fold cross-validation, with the value set in a 10-fold cross-validation sampling method, was used to address possible overfitting. The area under the receiver operating characteristic curve was calculated to assess the predictive performance of the decision tree for the retention of new graduate nurses. Statistical analyses were performed using SPSS Statistics for Windows version 26 (IBM Corp., Armonk, NY, USA).

3. Results

3.1. Participant Characteristics. Data from the 586 participants are presented in Table 1. A total of 463 participants (79.0%) had no job turnover experience since starting their first nursing job at a hospital. Regarding anticipatory socialization factors, the mean age of the participants was 24.8 ± 1.3 years, and the majority (91.0%) was women. Overall, 82.6% of the participants had graduated from university and most attended nursing schools located in the capital area (52.6%). Only 4.3% of the participants had achieved a second degree, 68.3% had academic resources available, and 97.6% had experience with simulation education. Of the participants, 91.3% had not undergone an internship at a hospital when they were nursing students. The mean readiness for practice score at the time of

TABLE 1: Differences in general characteristics between the retention and turnover groups (N = 586).

Variables	Categories	Total (586) Mean ± SD or n (%)	Retention (n = 463) Mean ± SD or n (%)	Turnover (n = 123) Mean ± SD or n (%)	χ^2 or t (p)
<i>Anticipatory socialization</i>					
Personal factors					
Age (years)		24.8 ± 1.3 (22–29)	24.7 ± 1.2	25.1 ± 1.6	-2.371 (0.018)
Gender	Women Men	533 (91.0) 53 (9.0)	421 (79.0) 42 (79.2)	112 (21.0) 11 (20.8)	0.002 (0.965)
Educational factors					
Type of school	University College	484 (82.6) 102 (17.4)	383 (79.1) 80 (78.4)	101 (20.9) 22 (21.6)	0.025 (0.874)
Location of school	Capital area Rural	308 (52.6) 278 (47.4)	237 (76.9) 226 (81.3)	71 (23.1) 52 (18.7)	1.655 (0.197)
Second degree	Yes No	25 (4.3) 561 (95.7)	19 (76.0) 444 (79.1)	6 (24.0) 117 (20.9)	0.025 (0.874)
Academic resource availability	Yes No	400 (68.3) 186 (31.7)	315 (78.8) 148 (79.6)	85 (21.2) 38 (20.4)	0.051 (0.821)
Simulation education	Yes No	572 (97.6) 14 (2.4)	452 (79.0) 11 (78.6)	120 (21.0) 3 (21.4)	0.002 (0.967)
Internship	Yes No	51 (8.7) 535 (91.3)	43 (84.3) 420 (78.5)	8 (15.7) 115 (21.5)	0.947 (0.330)
Readiness for practice		2.86 ± 0.31	2.87 ± 0.31	2.80 ± 0.31	2.205 (0.028)
Clinical problem-solving		2.88 ± 0.77	2.90 ± 0.37	2.82 ± 0.38	2.029 (0.044)
Learning technique		2.92 ± 0.55	2.92 ± 0.56	2.92 ± 0.52	-0.045 (0.964)
Professional identity		2.94 ± 0.43	2.97 ± 0.42	2.86 ± 0.47	2.230 (0.027)
Trials and tribulations		2.73 ± 0.35	2.74 ± 0.36	2.69 ± 0.32	1.597 (0.112)
<i>Organizational socialization</i>					
Work characteristics					
Work experience in current hospital (Months)		8.3 ± 3.9 (0.03–15.0)	9.4 ± 3.3	4.21 ± 3.0	16.804 (p < 0.001)
Working unit	General ward Special care unit (ICU, ER, OR)	321 (54.8) 237 (33.3)	246 (76.6) 195 (82.3)	75 (23.4) 42 (17.7)	2.621 (0.270)
Desired unit	Others Yes No	28 (4.8) 335 (57.4) 249 (42.6)	22 (78.6) 272 (81.2) 191 (76.7)	6 (21.4) 63 (18.8) 58 (23.3)	1.751 (0.186)
Number of preceptors	1 2 Over 3	366 (62.7) 108 (18.5) 110 (18.8)	289 (79.0) 88 (81.5) 86 (78.2)	77 (21.0) 20 (18.5) 24 (21.8)	0.422 (0.810)
Transition shock		2.82 ± 0.47	2.77 ± 0.45	3.00 ± 0.50	-4.978 (p < 0.001)
Conflict between theory and practice		2.81 ± 0.54	2.78 ± 0.52	2.94 ± 0.60	-2.821 (0.005)
Overwhelming workload		2.97 ± 0.62	2.93 ± 0.61	3.09 ± 0.66	-2.526 (0.012)
Loss of social support		2.17 ± 0.73	2.12 ± 0.70	2.37 ± 0.79	-3.481 (0.001)
Shrinking relationships with coworkers		3.10 ± 0.64	3.05 ± 0.62	3.28 ± 0.69	-3.497 (0.001)
Confusion in professional values		2.84 ± 0.65	2.77 ± 0.64	3.10 ± 0.62	-5.063 (p < 0.001)
Incongruity in work and personal life		2.72 ± 0.78	2.65 ± 0.75	2.97 ± 0.81	-4.042 (p < 0.001)
Person-environment fit		2.69 ± 0.77	2.75 ± 0.75	2.45 ± 0.81	3.861 (p < 0.001)

TABLE 1: Continued.

Variables	Categories	Total (586) Mean \pm SD or n (%)	Retention (n = 463) Mean \pm SD or n (%)	Turnover (n = 123) Mean \pm SD or n (%)	χ^2 or t (p)
Person-job fit		2.78 \pm 0.80	2.85 \pm 0.77	2.55 \pm 0.88	3.748 (p < 0.001)
Person-organization fit		2.60 \pm 0.88	2.66 \pm 0.87	2.36 \pm 0.90	3.364 (0.001)

graduation was 2.86 (SD = 0.31) on a 4-point scale. Among the subscales, "professional identity" ($M = 2.94$, $SD = 0.43$) was highest, followed by "learning technique" ($M = 2.92$, $SD = 0.55$), "clinical problem-solving" ($M = 2.88$, $SD = 0.77$), and "trials and tribulations" ($M = 2.73$, $SD = 0.35$).

In terms of socialization factors, the mean working experience at the current hospital was 8.3 (SD = 3.9) months. Of the participants, 54.8% worked in a general ward and 57.4% were assigned to the unit they desired. The highest number of participants (62.7%) answered that one instructor had educated them during the new nurse orientation period. The mean score of transition shock was 2.82 (SD = 0.47) on a 4-point scale. For the subscales, "shrinking relationships with coworkers" ($M = 3.10$, $SD = 0.64$) was highest, followed by "overwhelming workload" ($M = 2.97$, $SD = 0.62$), "confusion in professional values" ($M = 2.84$, $SD = 0.65$), and "conflict between theory and practice" ($M = 2.81$, $SD = 0.54$). The mean person-environment fit score was 2.69 (SD = 0.77) on a 5-point scale. The participants perceived that "person-organization fit" ($M = 2.60$, $SD = 0.88$) was lower than the "person-job fit" ($M = 2.78$, $SD = 0.80$).

3.2. Differences in the Groups' Characteristics. Compared with the turnover group, those in the retention group were statistically significantly younger ($M = 24.7$, $SD = 1.2$; $p = 0.18$), with higher scores for clinical problem-solving ($t = 2.029$, $p = 0.044$) and professional identity ($t = 2.230$, $p = 0.027$) on the readiness for practice scale. Simultaneously, they had lower transition shock ($t = -4.978$, $p < 0.001$) and higher person-environment fit ($t = 3.861$, $p < 0.001$) scores for all subdomains (Table 1).

3.3. CART Analysis for New Graduate Nurses' Retention. The variables ($p < 0.05$) from the univariate analysis were entered into the CART model. Figure 3 depicts the final decision tree analysis model for predicting new graduate nurse retention, ultimately generating five layers and seven nodes. Based on the conceptual framework [28], in terms of anticipatory socialization, readiness for practice and age were significant; for organizational socialization, transition shock and person-environment fit were substantial. The most important discriminating factors were as follows in the descending order: (sub) confusion in professional values of transition shock, (sub) clinical problem-solving of readiness for practice, age, (sub) person-job fit of person-environment fit, (sub) loss of social support of transition shock, and (sub) conflict between theory and practice of transition shock. Ten groups were identified, six of which had higher percentages of retention than the root node (boxes with red lines in Figure 3). Newly graduated nurses who scored lower than 3.38 for confusion in professional values and higher than 2.21 on clinical problem-solving were younger than 27.5 years; those who scored higher than 2.13 on person-job fit showed a higher retention rate. Otherwise, among the newly graduated nurses, those who scored higher than 3.38 on confusion in professional values, higher than 3.25 on loss of social support and lower than 2.83 on conflict between theory and practice showed higher retention.

We evaluated the quality of this model's performance using the receiver operating characteristic curve, which yielded an area under the curve of 0.700 (95% confidence interval of 0.636–0.750) and accuracy of 79.7%. This indicated acceptable diagnostic accuracy (exceeding 0.7) [35].

4. Discussion

To the best of our knowledge, this is the first study to identify educational factors from among school and organizational socialization factors in the workplace associated with the retention of new graduate nurses based on Scott's transition model [28]. Previous studies have found that the organizational-level working environment and personal-level transition shock are predominant factors influencing new nurses' turnover intentions [6, 11, 12]. Our study contributes to existing knowledge by examining the relationship between anticipatory (readiness for practice) and organizational (transition shock and person-environment fit) socialization, which are factors that affect actual turnover and retention. Compared to previous research, using decision tree methods provided an opportunity to review a wide range of factors affecting retention and also revealed the logic behind a retention or turnover decision. The CART model shows that retention is mainly related to the younger age group, higher readiness for practice (clinical problem-solving) in the nursing program, lower transition shock (confusion in professional values, loss of social support, and conflict between theory and practice), and higher person-environment fit (person-job fit).

In this study, approximately 21% of the newly graduated nurses reported that they had experienced job turnover since starting work at a hospital after graduation. According to a recent nationwide study in South Korea, the turnover rate of early career nurses with under three years of experience was 26.7% [36]. Another study using longitudinal panel data reported that 25% of new graduate nurses in South Korea left their jobs within the first year [37]. Considering that the average length of experience for our participants was approximately eight months, these results are consistent with our study. Considering South Korean hospitals generally provide an average of three to six months of training [38], new nurses who turn over within a year will have about six months of clinical experience. The quick turnover of new nurses necessitates more frequent recruitment processes, which cause additional financial burdens for staffing and training and hamper patient outcomes [36, 37].

Considering that the CART model ranked the features based on the Gini coefficient [34], confusion in professional values (a subdomain of transition shock) was ranked first. Our results are consistent with the findings of previous studies on nursing students [39, 40] and nurses [41, 42] indicating that higher professional values result in lower turnover intention. Feng and Tsai [43] found that when conflict occurs between the organizational value of pursuing work-centered nursing and professional value of pursuing patient-centered nursing, new nurses experience high levels of stress and confusion regarding professionalism. These results suggest that advancement of professional values may

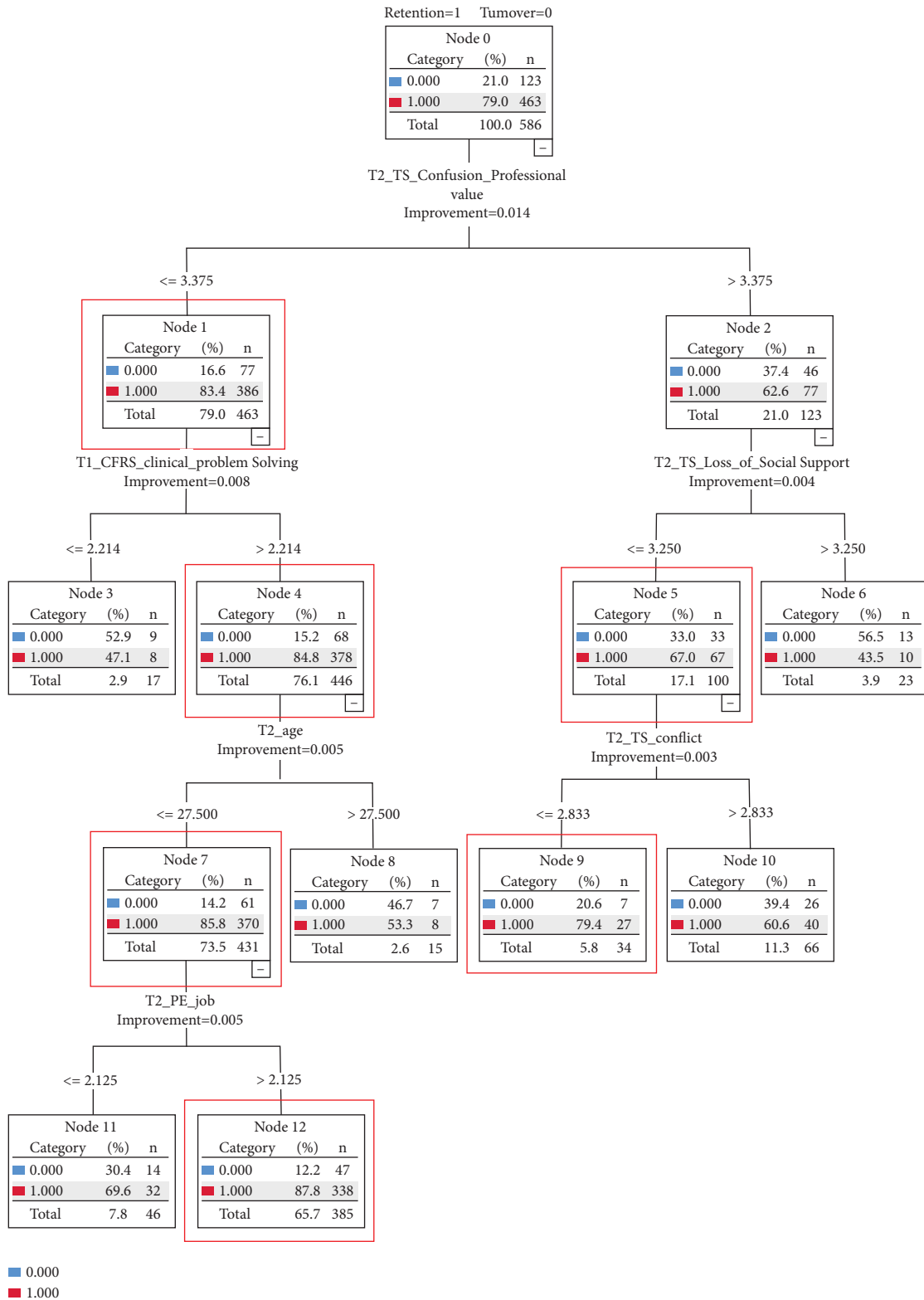


FIGURE 3: Classification decision tree analysis of the relationship between students and new nurses' characteristics.

increase the retention of new nurses by raising their sense of professionalism [41]. Based on these results, professionalism values can be claimed as a crucial factor in the retention of new nurses [44].

An interesting finding is that the participants who had confidence in clinical problem-solving when they were nursing students tended to remain in their jobs as new nurses. Problem-solving skills are a core competency of

professional nurses, who need to continuously identify patients' health problems and make clinical judgments in patient care [45, 46]. Nurse educators should pay attention to the problem-solving ability of new graduate nurses during the transition, optimize the new nurse orientation program, and conduct a series of training sessions using situational simulation and new media technology to improve their clinical reasoning [46].

Regarding age, this study's findings are contrary to those of previous studies that found that young nurses were more inclined to leave their work [10, 36, 47, 48]. According to Bae et al. [36], life events, including pregnancy and childbirth, increase actual turnover among nurses aged 20–35 years. A possible reason for this is the characteristics of our sample. Unlike previous studies, our study included only new graduate nurses in the 22–29-year age range, who had worked less than a year and were still in transition. Previous studies have reported that the age of senior nursing students is negatively correlated with their learning outcomes; confidence in managing multiple patients [49] and nursing skill competency [46] decrease as age increases. Considering that confidence and competence on the learning curve are likely to grow with experience [50], we cannot confirm the effect of age on the retention of nurses. This is because we followed up within a year of graduation, which is a very early career stage with an expectedly unstable transition process. Further studies are required to verify the relationship between age and retention over time.

Another noteworthy finding of this study is the positive relationship between person-job fit and retention, which affects the turnover of new graduate nurses. The more suitable the person-job fit, the more likely it is that new nurses will remain. Person-environment fit has been repeatedly identified as a predictor of turnover or turnover intention in the literature [51, 52]. It is possible that a good fit between the job and organization leads to higher job satisfaction, empowerment, and work engagement [51, 53, 54]. Person-job fit occurs when the staff's knowledge, skills, and abilities match work demands and the work performed meets their needs [55]. This suggests that hospital administrators and nurse managers should consider nurses' characteristics, needs, and values before assigning work and departments to enable them to perform to their full potential. In addition, they should provide nurses with precise and detailed job descriptions, and educational opportunities for updating skills and knowledge to continuously improve their work abilities.

In addition, participants with relatively low professional values were influenced by social support. This finding indicates that even if professional values are not strong, there is a high possibility of retention if strong social support is received. Social support is a job resource that facilitates employees' work motivation, involvement, and engagement, promoting wellbeing [56]. Previous studies have reported that well-supported nurses in hospitals show a higher intention to stay [11, 22]. Therefore, to retain new nurses, who face difficulties with unfamiliar work, unskilled interpersonal relationships, and the unestablished value of their profession [7], nurse managers,

coworkers, and supervisors should pay more attention to them at the organizational level. Support activities, such as peer support, collegiality fostering programs, and mentorship, can help new nurses alleviate job stress and promote personal meaningfulness and health and wellbeing at work and ultimately help them find the professional value [57, 58].

This study has several limitations. Despite the internal validation through CART analysis demonstrating excellent accuracy, the generalizability of the model would benefit from external validation using additional databases from different settings or populations. In addition, using convenience sampling resulted in a sample that was predominantly female and consisted of college graduates. This may lead to a lack of diversity. To address this limitation, future research should focus on employing more representative sampling methods, such as random or stratified sampling, to ensure a more diverse and inclusive participant pool. Furthermore, the variables in this study were measured using self-report, which may introduce potential biases or inaccuracies. To improve the robustness of future studies, it is recommended that readiness for practice and organizational socialization be assessed by third-party sources such as nursing faculty, preceptors, or supervisors. This approach provides a more objective and comprehensive evaluation of these factors, thereby enhancing the reliability and validity of the research findings.

5. Conclusions

We developed an internally validated decision tree model based on six factors to predict new graduate nurse retention using longitudinal data. This was accomplished by applying a conceptual framework with Scott's transition model for new graduate nurses in the workplace. The prediction algorithms and results of this study will contribute to transforming the educational strategies of undergraduate nursing programs and management policies of hospitals to enhance the retention of new graduate nurses. To retain new nurses in practice settings, nursing educators in schools and managers in hospitals should cooperate to prepare nursing students for practice, provide support to experience success in the organizational socialization process, and cultivate healthy professional values to grow as competent nurses in the workplace.

Data Availability

To ensure the confidentiality of the participants' personal information, the datasets are not publicly available.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

TL and YJ contributed to conceptualization, methodology, and formal analysis; TL contributed to supervision, project administration, and funding acquisition; YJ and YY

contributed to visualization; YJ, TL, and YY wrote the original draft and contributed to reviewing and editing. All the authors have read and approved the final manuscript.

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Research Article

Professional Quality of Life and Psychological Impact on Frontline Healthcare Worker during the Fourth Wave of COVID-19

Hanif Ullah ¹, Safia Arbab ², Chang-Qing Liu,¹ Sher Alam Khan,³ Sohail Shahzad,⁴ and Ka Li ¹

¹West China Hospital, West China School of Nursing, Sichuan University, Chengdu, China

²Lanzhou Institute of Husbandry and Pharmaceutical Sciences, Chinese Academy of Agricultural Sciences, Lanzhou, China

³Department of Pediatrics, Ayub Medical College, Abbottabad, Pakistan

⁴Department of Children Ward, Combined Military Hospital, Abbottabad, Pakistan

Correspondence should be addressed to Ka Li; lika127@126.com

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Aim. This research study aims to examine the professional quality of life (ProQOL) among healthcare workers (HCWs) in Pakistan during the fourth wave of COVID-19. **Background.** Under intense pressure to fight the coronavirus disease 2019 (COVID-19) pandemic, HCWs are more likely to experience psychological problems. Numerous investigations carried out in the past at various points during the pandemic have shown that COVID-19 has had important detrimental effects on HCWs. However, there are many unknowns with regard to ProQOL for HCWs. **Methods.** This is a cross-sectional study conducted with Pakistani HCWs who performed their duties during the fourth wave of COVID-19. Data were collected between January 1 and March 31, 2022. A total of 258 HCWs took part in the study evaluating ProQOL. The significance level was <0.05 . **Results.** Most respondents were males (79.1%), and 20.9% were females. The scores of secondary traumatic stress (STS), burnout (BO), and compassion satisfaction (CS) were 24.03 ± 3.79 , 19.18 ± 2.92 , and 35.29 ± 4.37 , respectively. Compared with higher-income groups, HCWs with lower incomes were significantly ($P < 0.001$) more likely to experience psychological issues. Males had lower BO and STS than female HCWs ($P < 0.001$). Similarly, doctors had a lower STS than nurses ($P < 0.05$). HCWs who worked hours per day longer had a heavier STS ($P < 0.001$). **Conclusion.** This study shows low BO levels, moderate CS levels, and STS levels among HCWs. HCWs with lower salary were at a higher risk of mental distress due to the pandemic. HCWs who worked for long hours and had less income had more STS and BO. HCWs who were dissatisfied with their works had poor CS. **Implications for Nursing Management.** It is supposed that these results may help HCW managers to improve job satisfaction and rewards while reducing working hours and workload to improve the ProQOL of HCWs fighting COVID-19. The government should focus on the mental health of HCWs, enhancing their satisfaction and allocating sufficient resources.

1. Introduction

The novel coronavirus disease 2019 (COVID-19) pandemic rapidly spread over the world, causing a threat to public health [1]. SARS-CoV-2 mostly affects and causes more damage to the respiratory system [2, 3]. On March 11, 2020, the World Health Organization (WHO) proclaimed COVID-19 to be a pandemic after the first case was discovered in Wuhan, China, in December 2019 [4]. This virus takes 2 to 14 days to incubate, and symptoms typically start

to manifest during this time [5]. On December 23, 2022, the disease infected 651.9 million confirmed cases of COVID-19, including 6.65 million deaths, across the world, as reported to the WHO [6]. The pandemic affected both developed and developing nations, with India, Brazil, and United States of America (USA) suffering greatly from its effects in terms of mortality and morbidity [7]. In a little period of time, the total number of confirmed cases in emerging or low-resource nations significantly increased. The world economy, particularly China and surrounding developing

countries such as Pakistan, Iran, India, Bangladesh, and Afghanistan, is becoming more at risk from COVID-19 [8, 9]. Pakistan has a low- to medium-level economy and 197 million inhabitants, making it a country with a high population density. In Pakistan, from 3 January 2020 to 13 December 2022, there were 1.57 million confirmed cases of COVID-19 with 30,635 deaths, according to the WHO [10]. COVID-19 is known to cause both physical and psychological problems in HCWs [11]. HCWs, such as physicians, nurses, and paramedics, are fighting the pandemic on the frontlines. As is frequently the case, medical staffs coping with such widespread epidemics are susceptible to psychological stress and changes in mood, which impact their health [12].

Healthcare professionals are involved in a variety of tasks, including isolating patients and preventing and controlling infections [13, 14]. In addition, they were at a greater risk of infection during patient care [15]. Although frontline HCWs primarily focus on preventing transmission and caring for COVID-19 patients, the pandemic's effects on mental health and their consequences cannot be underestimated [16]. Healthcare professionals are more frequently experiencing mental health issues such as anxiety, insomnia [17–21], and burnout syndrome (BS) [22]. Meanwhile, stress was a common problem for nurses fighting COVID-19 [23]. During the COVID-19 epidemic, the mental workload of nurses rose [24]. The physical and mental health of nurses may suffer when they work under conditions that raise their risk of infection, pressure, and workload, when there are not enough resources available, and when they have to carry out more physical and psychological labor [25]. The debate over how the COVID-19 epidemic has affected mental health conditions has uncovered glaring gaps in the information that is currently available on the frequency of depression, anxiety, and sleep disturbance amongst HCWs. Therefore, it is essential to identify the mental health burden and deal with it appropriately [26].

Even before the pandemic, there were high levels of burnout and exhaustion among HCWs in Pakistan. According to a cross-sectional study on burnout among 179 HCWs in emergency rooms, 42.4% of them showed emotional fatigue [27]. A study conducted in 2019 that evaluated 118 surgical residents in Karachi discovered that women had greater emotional exhaustion (49.2%) than men did (50.8%). In addition, married individuals showed higher degrees of personal fulfilment and sleep deprivation than single individuals did [28].

A study conducted in six hospitals in Pakistan using the PHQ-9 and GAD-7 scales to evaluate 400 healthcare workers during the first wave of COVID-19 revealed that 21.8% of them had moderate-to-severe anxiety or depression [29]. Similar results were found in a study conducted on 398 healthcare workers from Punjab, where the prevalence of anxiety and depression was 21.4% and 21.9%, respectively [30]. A study of 87 HCWs during the second COVID-19 wave found that 54% of participants experienced psychological fatigue, 77% experienced depersonalization, and 31% experienced low personal accomplishment. These symptoms were all linked to a history of COVID-19 infection or contact

with patients who had such a history [31]. As of January 27, 2021, a third-wave novel SARS-CoV-2 variant from the UK, also known as B.1.1.7, had been identified in over 64 countries, including Pakistan. With an average of 100 individuals dying away in Pakistan every day, this B.1.1.7 variant is linked to a higher risk of death than other variants, implicating more burdens on healthcare professionals [32]. In Pakistan, higher levels of burnout were observed in the COVID-19 fourth wave, likely as a result of the pandemic's cumulative physical and emotional repercussions; however, much is still not entirely clear at this time [33]. It is important to comprehend the long- and short-term effects of CS, BO, and SCS in a lower-middle-income nation such as Pakistan. These effects include decreased healthcare quality, an increase in errors, and a decrease in ProQOL, low job satisfaction, and significant costs [33, 34]. However, during the fourth wave of the pandemic, Pakistan did not routinely report on the prevalence of CS, BO, and STS in HCWs. Therefore, in light of the fourth wave of the COVID-19 outbreak, the purpose of our study is to evaluate the levels of the contextual variables depressive concerns, BO, CS, and STS among HCWs in Pakistan.

2. Methods

2.1. Study Design and Participants. To learn more about the experiences of frontline HCWs caring for patients with COVID-19, a cross-sectional study was carried out. The study was conducted at two governmental health institutions, namely, Ayub Teaching Hospital and Combine Military Hospital Abbottabad, Pakistan. The inclusion criteria for participation in this study were as follows: (1) voluntary participation in the study; (2) healthcare workers on the frontline against COVID-19; and (3) healthcare workers with direct bedside care experience involving COVID-19 patients. Exclusion criteria were as follows: nonfrontline HWCs involved in scientific research, teaching, and hospital administration [13]. Because there were nurses characterized by different levels of experience at least 5–10 times as many variables were represented in the sample size [13]. The current study included 20 variables. A total of 286 questionnaires were collected, 258 questionnaires were included for the final data analysis after those that did not match the requirements were removed.

2.2. Measures and Instruments. The relevant published articles and scientific literature on COVID-19 were examined to create a structured questionnaire [13, 26]. The questionnaire was administered in the English language, which is the official language of Pakistan. Three different sections were made in the questionnaire used: (1) sociodemographic information; (2) healthcare worker work conditions and COVID-19 pandemic-related aspects; and (3) mental health conditions [13]. The demographic features comprised of HCWs are their gender, marital status, age, work experience, educational attainment, the infection status (COVID-19) of friends or family members of the HCW, the number of night shifts worked per week, the number of working hours during

the epidemic, job satisfaction, pay satisfaction, and work load [13]. The ProQOL Scale was used to measure ProQOL. The ProQOL Version 5 was the instrument used; it consists of 30 items organized into three subscales: burnout (BO), compassion satisfaction (CS), and secondary traumatic stress (STS). The following items were used to test CS: 3, 6, 12, 16, 18, 20, 22, 24, 27, and 30. Items associated with burnout (items 1, 4, 8, 10, 15, 17, 19, 21, 26, and 29 of the ProQOL tool) and STS (items 2, 5, 7, 9, 11, 13, 14, 23, 25, and 28) were included in order to quantify CF. A 5-point Likert scale was used to record responses to these questions, with 1 indicating never, 2 very rarely, 3 sometimes, 4 often, and 5 indicating very often [35]. In published papers, the ProQOL shows high validity and reliability [36, 37]. According to Cronbach's alpha values of 0.89 for CS, 0.83 for BO, and 0.78 for STS in the primary research study, the ProQOL tool was considered reliable. Therefore, a Cronbach's alpha of 0.80 or higher is regarded as particularly desirable for all aspects [38]. The healthcare worker participants were contacted by WhatsApp, and they were informed about the study's purpose and the researchers' interest in the research topic. The hospital administrators providing respondents who were battling COVID-19 were contacted to discuss the goal of our investigation. Those who were not medical professionals and did not finish the assessment were excluded from this survey.

2.3. Data Collection. Data were collected between January 1 and March 31, 2022. Google Forms software was used to generate a survey, and the link to it was distributed via WhatsApp. Since every question was needed, only surveys that were completely filled out were collected, ensuring that there were no missing data. The healthcare worker assisted in distributing the surveys individually and through WhatsApp groups. It took approximately 10–15 min to complete the questionnaire.

The combined military hospital in Abbottabad's Ethical Research Committee gave its approval to the current study (CMH Atd-ETH-78-Paed-23). To participate in our online survey, respondents had to assent (accept or deny) to the informed consent declaration on the first page.

2.4. Statistical Analysis. Data collected from respondents were directly deposited in Google Worksheets and later transfer into Microsoft Excel and SPSS 22.0. The data analysis, which was based on the quantitative analysis, combined descriptive and inferential statistics. Descriptive statistics (univariate analysis) were performed for each main variable of the study, whether it was an independent or dependent variable, using frequency counts, percentages, and mean \pm standard deviation (SD). The socioeconomic characteristics of the individuals and variables associated with HCWs were examined using the chi-square test. The ProQOL manual states that the responses to items 1, 14, 15, and 17 should be reversed to become (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1). The ProQOL was at a low level in the end, with sum answers of ≤ 22 and a moderate level with sum answers of 23–41; the ProQOL was at a high level, and the sum answers were ≥ 42 [35]. The significance level was < 0.05 .

3. Results

3.1. Demographic Characteristics. A total of 258 healthcare workers (204) (79.1%) were males, and 54 workers (20.9%) were females. Regarding marital status, 31.3% were single, and 68.7% were married. Regarding age, 50% were 18–30 years old, 43% were 31–40 years old, and 6.97% were > 40 years old. On the basis of education, 32.6% had graduated, and 65.1% had postgraduate or above education. Moreover, 2.3% were senior medical students in the last stage of their undergraduate studies. In this study, 76.7% of the participants were physicians, 10.5% were nurses, 11.6% were technicians, and 1.2% were assistants. Furthermore, we found 5.8% of participants from the infectious disease department, 9.3% from the surgical department, 3.5% from the ICU, 15.1% from internal medicine, 16.3% from emergency, and 50% from other departments. Among all participants, 37.2% were satisfied with their monthly salary, 29% were not satisfied, 6.9% were very satisfied, and 26.7% were normal. Regarding work burden, 44.2% showed a heavy work burden. The time interval of duty shown by the participant included 38.3% working for 8 h per day, 57% working for 9–12 h per day, and 4.6% working for 12 h per day as clinical frontline staff, as shown in Table 1. In addition, 34.9% of HCWs had 2 night shifts per week, 20.9% had 1 night shift per week, and 10.5% had 3 night shifts per week. Here, we found that 61.3% of HCW families were infected with COVID-19, and 68.6% of HCW lives were affected by COVID-19, as shown in Table 1.

3.2. Prevalence of ProQOL in Healthcare Workers. The healthcare workers' average scores for CS, BO, and STS were categorized into low, moderate, and high groups. The mean scores \pm standard deviation (SD) was as follows: CS was 35.29 ± 4.37 , while BO and STS were 19.18 ± 2.92 and 24.03 ± 3.79 , respectively. These results indicate that healthcare workers generally experience low levels of STS and moderate levels of CS and BO. Specifically, the results reveal that healthcare workers reported moderate levels of compassion satisfaction (60.5%) to low levels (20.9%), low levels of STS (48.8%) to moderate levels (40.3%), and moderate levels of burnout (48%) to low levels (39.5%). Details are shown in Table 2.

3.3. Factors Related to HCWs' ProQOL. In univariate analysis, general data were used as independent factors and anxiety, depression, BO, STS, and CS were used as dependent variables, and the findings demonstrated that HCW age, marital status, number of working hours per day, workload, and job satisfaction were associated with STS; workload, job satisfaction, and salary satisfaction were associated with BO and CS ($P < 0.05$; Table 3). Chi-square analysis was performed, and it showed that males possessed lower anxiety, depression, STS, and compassion satisfaction than female HCWs ($P < 0.001$). Single HCWs had a lower burnout risk than married HCWs ($P < 0.006$). HCWs aged 18–30 had heavier STS than HCWs aged 31–40 and ≥ 41 ($P < 0.001$). Physicians had lower anxiety and depression,

TABLE 1: Sociodemographic and work-related characteristics of 258 frontline HCWs against COVID-19.

Variable	N (%)
Gender	
Male	204 (79.1)
Female	54 (20.9)
Marital status	
Single	81 (31.4)
Married	177 (68.6)
Age	
18–30	129 (50.0)
31–40	111 (43.0)
>41	18 (7.0)
Education	
Graduate	84 (32.6)
Postgraduate	168 (65.1)
Junior	6 (2.3)
Professional title	
Physicians	198 (76.7)
Nurse	27 (10.5)
Technician	30 (11.6)
Assistant	3 (1.2)
Monthly salary	
<50,000 PKR	54 (20.9)
50,000–100,000 PKR	132 (51.1)
>100,000 PKR	72 (28.0)
Workload is very heavy	
Yes	114 (44.2)
No	24 (9.3)
Normal	120 (46.5)
Number of night shifts per week	
0	87 (33.7)
1	54 (20.9)
2	90 (34.9)
≥3	27 (10.5)
Family infected with COVID-19	
Yes	159 (61.6)
No	99 (38.4)
COVID-19 has affected eating habits	
Yes	120 (46.5)
No	123 (47.7)
Normal	15 (5.8)
COVID-19 has affected my job	
Yes	171 (66.3)
No	87 (33.7)
Satisfaction by monthly salary	
Very satisfied	18 (7.0)
Satisfied	96 (37.0)
General	69 (27.0)
Not satisfied	75 (29.0)
Work experience (years)	
1–5	138 (53.5)
5–10	84 (32.5)
>11	36 (14.0)
Working hours per day (h)	
<8	99 (38.4)
9–12	147 (57.0)
>12	12 (4.6)
Department	
ICU	9 (3.5)
Infectious disease ward	15 (5.8)
Surgical	24 (9.3)

TABLE 1: Continued.

Variable	N (%)
Internal medicine	39 (15.1)
Emergency dept	42 (16.3)
Other	129 (50)
Job satisfaction	
Very satisfied	42 (16.3)
Satisfaction	135 (52.3)
General	60 (23.3)
Not satisfied	21 (8.1)
COVID-19 has affected personal life	
Yes	177 (68.6)
No	60 (23.3)
Normal	21 (8.1)
COVID-19 has affected sleeping pattern	
Yes	117 (45.3)
No	123 (48.0)
Normal	18 (7.0)
Are you worried about COVID-19?	
Yes	156 (60.5)
No	78 (30.2)
Normal	24 (9.3)
Have accomplished all job tasks?	
Yes	189 (73.2)
No	42 (16.3)
Rare	27 (10.5)

TABLE 2: Prevalence of ProQOL in healthcare workers ($n = 258$).

Variables	Categories	n	Prevalence (%)
Burnout	Yes	44	17
Secondary traumatic stress	Yes	144	56.2
Compassion satisfaction	Yes	124	48
	Low	102	39.5
Burnout	Moderate	123	48
	High	12	12.5
	Low	111	43
Anxiety and depression	Moderate	120	46.5
	High	27	10.5
	Low	126	48.8
Secondary traumatic stress	Moderate	102	40.3
	High	30	10.9
	High	48	18.6
Compassion satisfaction	Moderate	156	60.5
	Low	54	20.9

STS, and compassion satisfaction than nurses, technicians, and assistants ($P < 0.05$). The HCWs who worked in the emergency department, ICU, and internal medicine department had higher levels of burnout, anxiety, and depression than those who worked in other departments or units ($P < 0.05$). Those with 1–5 years of work experience had a larger percentage of moderate STS than those with more than 5 years of work experience ($\chi^2 = 13.738$, $P = 0.008$). Working hours per day (h) longer, the STS was heavier ($\chi^2 = 46.748$, $P < 0.001$). When the job was more satisfied, the HCWs had lower anxiety and depression ($\chi^2 = 15.020$, $P = 0.005$) and secondary traumatic stress ($\chi^2 = 9.526$, $P = 0.009$). In addition, the HCWs had more

TABLE 3: Factors related to HCWs' professional quality of life.

Variable	Burnout			Anxiety and depression			Secondary traumatic stress			Compassion satisfaction		
	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Gender												
Male	87	90	27	99	90	15	114	72	18	33	132	39
Female	15	33	6	12	30	12	14	28	12	21	24	9
χ^2		5.125			17.097			17.335			13.089	
<i>P</i>		0.077			0.001			0.001			0.001	
Marital status												
Single	39	27	15	31	35	15	35	34	12	15	48	18
Married	63	96	18	84	75	18	99	60	18	39	102	36
χ^2		10.337			4.090			3.758			0.448	
<i>P</i>		0.006			0.129			0.153			0.799	
Age												
18–30	45	60	24	34	69	26	41	39	31	36	56	19
31–40	29	63	19	37	67	25	42	63	6			
≥41	4	9	5	3	10	5	7	9	2	3	11	4
χ^2		4.014			1.529			24.626			3.346	
<i>P</i>		0.404			0.820			0.001			0.188	
Professional title												
Doctor	75	102	21	87	87	24	69	112	18	66	123	9
Nurse	9	13	5	7	17	4	4	21	2	2	25	0
Technician	8	17	5	3	25	2	5	22	3	7	17	3
Assistant	1	2	0	0	3	0	0	3	0	1	2	0
χ^2		2.691			23.597			9.964			20.096	
<i>P</i>		0.611			0.001			0.041			0.001	
Department/unit												
Other	59	57	13	54	66	9	42	81	6	33	89	7
Emergency	15	17	10	7	22	13	13	25	4	0	0	0
ICU	2	3	4	1	4	4	4	3	2	5	3	1
Internal medicine	10	18	11	8	23	9	7	27	5	6	31	2
χ^2		14.387			25.929			5.534			0.160	
<i>P</i>		0.006			0.001			0.237			0.923	
Work experience (years)												
1–5	54	66	18	49	74	15	32	102	4	17	113	9
5–10	32	46	6	18	56	10	11	67	7	15	61	8
11	9	23	3	7	25	2	14	19	3	3	29	2
χ^2		5.231			8.146			13.738			3.093	
<i>P</i>		0.264			0.086			0.008			0.542	
Working hours per day (h)												
8	34	56	9	20	71	8	45	48	6	23	67	9
9–12	39	84	24	37	99	11	23	117	7	34	106	7
12	4	5	3	3	5	4	9	3	0	3	9	0
χ^2		5.096			4.922			46.748			3.404	
<i>P</i>		0.278			0.295			0.001			0.493	
Job satisfaction												
Very satisfied	4	38	0	4	36	2	2	40	0	3	38	1
Satisfied	23	94	12	31	89	9	15	12	2	21	104	4
General	15	42	3	5	47	8	3	56	1	4	54	2
Not satisfied	2	15	4	3	7	11	5	7	9	4	11	6
χ^2		5.931			15.020			9.526			5.828	
<i>P</i>		0.204			0.005			0.009			0.054	
Satisfaction by monthly salary												
Very satisfied	3	15	0	2	13	3	6	12	0	9	9	0
Satisfied	12	75	9	23	66	7	13	80	3	22	72	2
General	9	52	8	14	48	13	11	60	4	0	53	0
Not satisfied	5	38	32	20	38	35	13	44	12	17	38	14
χ^2		22.660			29.122			58.711			29.096	
<i>P</i>		0.001			0.001			0.001			0.001	

satisfaction by monthly salary, and they had poor levels of burnout, anxiety, depression, STS, and CS ($P < 0.001$) (Table 3).

4. Discussion

The current findings demonstrated that during the COVID-19 pandemic, HCWs had a high frequency of self-reported sociodemographic and psychological issues. The prevalence of anxiety, depression, burnout, and general psychological issues varied significantly among different types of healthcare employees. This research revealed several sociodemographic factors associated to HCWs to help officials and policymakers establish policies and improve HCW facilities. Due to their frequent use of empathy, extended exposure to secondary trauma, and work environment, healthcare practitioners are likely to feel depression, anxiety, burnout, and secondary traumatic stress [39]. In addition, the constrained resources and numerous healthcare needs during this time may raise the possibility of compassion fatigue. This evidence has increased the risk of psychological distress due to the pandemic.

According to our research, HCWs had to moderate degrees of anxiety and depression, whereas high levels of depression signs and symptoms were found in Indian healthcare professionals who were classified as having moderate-to-severe depression symptoms (22% of them) [40]. During the COVID-19 pandemic, HCWs who scored higher on fatigue, melancholy, anxiety, and stress also had a greater fear of contracting coronavirus [41]. In China, healthcare professionals and nurses experienced symptoms of despair, anxiety, insomnia, and discomfort two months after the first identified COVID-19 case [42]. Managing COVID-19 patients led to increased anxiety and reduced health-related quality of life [43]. Frontline healthcare workers with moderate-to-severe depression and anxiety symptoms saw a decline in their overall quality of life [40].

According to our research, medical staffs that have been exposed to the COVID-19 pandemic might experience both positive and negative psychological consequences. According to the results, STS and burnout were frequent, although levels of CF varied from moderate to high. While greater levels of CS and less CF were detected in HCWs who reported feeling highly content with their salaries, less BO was seen in HCWs who reported feeling highly satisfied with their earnings ($P < 0.05$). Similarly, during the pandemic, 72.5% of nurses were satisfied with their current job, while 73.6% of nurses were satisfied with their pay [44]. Less BO was experienced by nurses who were satisfied with their pay, while higher CS and less CF were seen in nurses who were highly satisfied with their jobs [13]. During the COVID-19 epidemic, similar findings were reported in Ecuador, where medical staff experienced mild to moderate burnout and CF [45]. Similar findings were made by Jordan et al. in their study, which revealed that high-income nurses had a low incidence of CF [46]. According to Tian et al., nurses who were dissatisfied with their salaries had higher BO [47]. In addition, in the study reported by Niu et al., nurses who reported having low job satisfaction were more likely to

suffer from CF, which is consistent with our findings regarding job satisfaction [13].

The results of this study showed that STS scores were greater than the crucial value, as well as higher than those of Turkish nurses prior to the pandemic and Italian nurses during the pandemic [48]. The signs and symptoms of STS can include anxiety, sleeplessness, and intrusive thoughts [49]. Patients with COVID-19 are more likely to experience mood swings, irritability, and grief [13]. HCWs who interact with these patients could feel a great deal of psychological pressure. It has been discovered that nurses fighting the pandemic are more likely to have symptoms of somatization [50]. As a result, it is essential to care about HCWs and STS, offer social and psychological support, promote a healthy team culture, and engage in proper exercise to lessen the pandemic's negative effects on HCWs.

In this study, HCWs with excessive workloads exhibited higher levels of BO and STS ($P < 0.001$), as well as substantially lower CS levels. According to certain research and our study, nurses who work a lot are more likely to experience STS, which lowers job satisfaction and BO [51]. In a 2020 study with 506 Spanish healthcare professionals, 94% showed moderate-to-severe compassion fatigue, 84% showed moderate-to-severe burnout, and 84.4% of the entire sample showed moderate-to-severe compassion satisfaction [52]. Burnout and secondary traumatic stress were more severe in physicians than in nurses. In addition, nurses had higher levels of compassion satisfaction. Another Spanish study of 973 healthcare professionals revealed that 90.6% had high levels of compassion satisfaction, noting that this trait is more common in people between the ages of 35 and 55 and that nurses outnumbered physicians even though nurses were more prevalent [53].

The study's findings showed that the COVID-19 pandemic significantly increased the burden of psychological issues among various healthcare professionals. The results imply that exposure to negative information about the pandemic may be linked to a higher risk of psychological issues. Participating in frontline work appears to be a significant risk factor for anxiety, sleeplessness, and psychological issues in general [54–56]. These results suggest the implementation of measures that go beyond saving patient lives with COVID-19 psychosocial interventions and support for healthcare workers, which will help us better understand the impact of pandemics on psychological health among HCWs. Early in the pandemic, support for transient psychological issues, including anxiety and depression, is required, along with evidence-based psychosocial therapies. Furthermore, stress should be placed on self-relaxation training, regular exercise, and a healthy lifestyle.

4.1. Limitations of the Work. This study has certain limitations, even if it adds empirically to the conversation about the ProQOL of HCWs. First, because the study was performed online, self-selection bias could have been a factor. Considering that a convenience sample was used, it is not possible to extrapolate the findings to other situations because they may not accurately represent the population. This

study was cross-sectional in design and evaluated ProQOL at a single moment in time within the particular era and COVID-19 pandemic scenario, care must be taken when interpreting the data. As the number of COVID-19 cases continued to rise in Pakistan during the fourth wave, hospitals faced increasing strain from the influx of patients. Government policies proved ineffective due to public indifference. Notably, the private sector hospitals in Pakistan outnumber government-run facilities, and they have a larger contingent of healthcare professionals, particularly physicians and doctors, compared to nurses and other healthcare providers. Consequently, during the fight against COVID-19, physicians had to take on the frontline roles compared to nurses and other professionals following suit [57]. In addition, there is a significant gender disparity in the healthcare workforce, with a higher proportion of men compared to women, largely attributed to the country's ongoing struggle for women's empowerment and education. This gender imbalance is especially prominent in roles such as nursing and nursing assistants, where men dominate the positions [58]. Another limitation of the study is its cross-sectional design, as the pandemic has since subsided and the study cannot capture the long-term impact on the mental health of these frontline healthcare workers. To address this, it would be advisable to conduct a longitudinal study to track the evolution of the mental health symptoms assessed in this research over time.

5. Implications for Nursing Management

Prior to fighting the epidemic, it is essential to teach HCWs about patient knowledge, epidemic control and preventive techniques and to build personal resiliency. Programs for stress management and peer social support are also essential to lower BO and STS levels, and they should offer efficient interventions to increase HCWs' satisfaction levels. The foundation of the healthcare system's physical and mental health must be protected; thus, governments must take the necessary action. Financial subsidies and rewards from the government are advised to increase work satisfaction for HCWs. According to our research, structural empowerment techniques can be developed by hospital administration and HCWs to improve HCWs' psychological empowerment. We also advocate for the development of counseling services, assistance, and programs to support HCWs' psychological well-being. These measures will help preserve a strong team culture.

6. Conclusion

The HCWs have moderate levels of compassion satisfaction, secondary traumatic stress, and low levels of burnout. High levels of perceived susceptibility and severity, as well as elevated psychological distress, are present in HCWs battling COVID-19. Healthcare professionals' levels of anxiety and CF may be impacted by professional contextual factors (poor income and lengthy hours). HCWs with a heavy workload and little pay had more severe depression and STS. The administration of the hospital must to keep a low degree of

burnout, increase CS levels, manage STS levels, and provide HCWs with a good work environment. Further research studies with different research approaches and different low-resource sceneries are suggested to address the professional quality of life level.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request. The data are not publicly available because of privacy or ethical restrictions.

Disclosure

The funders had no involvement in the study design, experimental process, analysis, or manuscript writing or reviewing.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Hanif Ullah and Safia Arbab wrote the manuscript. Chang-Qing Liu helped with statistics. Sher Alam Khan and Sohail Shahzad helped with data collection. Ka Li led the study. All authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript.

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Research Article

Psychological Profile of Nurse Managers in the Post-COVID-19 Era: Implications for Nursing Leadership

Majed Mowanes Alruwaili 

Nursing Administration and Education Department, College of Nursing, Jouf University, Sakaka 72388, Saudi Arabia

Correspondence should be addressed to Majed Mowanes Alruwaili; majed@ju.edu.sa

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Aim. This study examined the mental health of nurse managers in the Kingdom of Saudi Arabia. *Background.* The COVID-19 pandemic has affected the physical and mental health of senior nurses, including effects of shortages of staff and medical supplies. However, no study has examined this topic among nurse managers in the Kingdom of Saudi Arabia despite their exposure to mental stress during the pandemic. *Methods.* A cross-sectional design was used to investigate the levels of depression, anxiety, stress, and general psychological distress among nurse managers in Saudi Arabia. Data were collected August 2023 to February 2024. The main tool was the reliable and validated Arabic translation of the Depression, Anxiety, and Stress Scale (DASS-21). Data collection was performed using an online platform. IBM SPSS software was used for data analysis. The data was analysed using multiple regression to examine the relationship between the dependent (outcome) and independent (predictor) variables. A significant *p*-value was set at 0.05. *Results.* Stress and general psychological distress were the most common problems among nurse managers in the post-COVID-19 era. Individual educational attainment was the only significant predictor of anxiety, stress, and general psychological distress. Moreover, the nationalities of nurse managers were correlated with stress outcomes. *Conclusions.* Nursing managers are very likely to suffer from stress and general mental health problems in cases of exposure to crises. They may find the results of this study useful in understanding the factors that may play a role in the development of mental health problems during clinical work. Different strategies can be considered to alleviate depression, anxiety, and stress among managers, including the proper delegation of tasks. Top-level management and healthcare stakeholders should give special considerations to the nationality and education level upon selecting nurse managers at different levels. *Implications in Nursing Management.* Policy makers involved in planning care for healthcare professionals may find this study valuable in planning for future pandemics by developing a strategy that could reduce stress and psychological distress.

1. Introduction

The role of care managers has become increasingly important since the advent of COVID-19 as competent care management can mitigate many of the problems that nurses face [1]. Hospital management by nurse managers has been found to be associated with staff shortages, crisis management, and related psychological problems [2]. Several factors put the physical and mental health of caregivers at risk from COVID-19, including shortages of staff and medical supplies, a lack of personal protective equipment (PPE), and limited hospital beds [3]. Nurse managers also struggle with physical and mental health problems [1]. COVID-19 has

presented a challenge to hospital managers as increasing demand for care was accompanied by workforce shortages and crisis management. The mental health of nurse managers can be compromised by demands of providing emotional support, managing medical supply and Personal Protective Equipment (PPE) inventories, and supporting team members during pandemics [4–6]. In addition, the lack of previous experience in dealing with pandemics and the lack of effective preparation by the respective authorities or policy makers could also contribute to the management challenges [1, 2]. The reasons given for the scale of the problem were the complex and expensive diagnostic procedures and therapeutic equipment and application

methods, combined with the need for more staff and the shortage of hospital beds, as well as disproportionate management for the allocation of resources and the lack of a standard program for the preparation and response phase, alongside inadequate staff training and practice and the varying experience of health managers, which made the situation more difficult for nurse managers and their subordinates [2, 3, 7].

To date, no study has examined the mental health of nurse managers in the Kingdom of Saudi Arabia (KSA) in this context, despite their exposure to psychological stress during the pandemic. The pandemic lasted for more than three years, and professionals have continuously taken precautions to contain it. It is believed that it is appropriate to assess the mental health of nurse managers since they have continuously provided managerial guidance and control during and after the pandemic, and the resulting stress can increase the risk of mental health problems. Hence the need for this study, which could potentially reveal the extent of the problem and possible measures to mitigate it in the clinical setting.

The COVID-19 pandemic has had a significant impact on the mental health of adults and children alike [8]. Nearly 50% of the respondents to a US survey had recently experienced anxiety or sadness, and 10% felt that their mental health needs were not being met [8]. The rates of anxiety, depression, and substance-use disorders have increased since the epidemic began [9]. People with mental illnesses or disorders that are worsened by COVID-19 were found to be more likely to die than people without mental illnesses [8]. Mental illness has become an important research topic, and researchers are developing strategies to diagnose, prevent, and treat them [8, 9].

Evidence suggests that infected individuals are more likely to develop mental illness or disorders, including posttraumatic stress disorder [9]. The symptoms associated with long COVID-19 can affect brain functioning and mental state [8, 9]. In particular, the presence of COVID-19 may be associated with cognitive and attention deficits (brain fog), anxiety, depression, psychosis, seizures, and suicidality [8].

There is a potential threat to the health and wellbeing of leaders of hospitals and healthcare organizations (including leaders in nursing) due to increasing demands for restructuring of infection control systems [8]. Therefore, it is necessary to examine the psychological state of leaders in nursing in the post-COVID-19 era. Such information could help in the future design and development of health system policies that address staff wellbeing. The study objectives were to investigate the levels of depression, anxiety, stress, and general psychological distress among nurse managers in the post-COVID-19 pandemic era and to explore factors that affect their psychological profiles.

2. Methods

2.1. Study Design, Population, and Settings. This study used a cross-sectional survey design. Participants were recruited from June to November 2023 using convenience sampling.

The software G*Power Online 3.1.9.4 was used to determine the sample size needed based on a previous study investigating ethical leadership of nurses with a moderate effect size of 0.65 [10]. With a power of 80% (0.8) and a significance level of 0.5, the required sample size was 76 participants. Taking into account the possibility of 20% attrition after 2 months, the total sample size for the study groups was 92 participants. The criteria for participation in the study were age >18 years, employment in a public hospital as a nurse manager (e.g., nursing directors, heads/supervisors of nursing departments, and ward managers), and the ability to speak Arabic or English. The participants were recruited from all regions of the Kingdom of Saudi Arabia.

2.2. Measures. A wide range of sociodemographic information was collected from the participants, such as age, sex, marital status, employment, and level of education. Data were collected online by a trained research assistant. Informed consent forms were provided to all eligible participants after an explanation of the study procedure was given.

The Arabic version of the Depression, Anxiety, and Stress Scale (DASS-21) was used to assess symptoms of depression, anxiety, stress, and general psychological distress [11–13].

The DASS-21 test contains 21 items and three subscales: depression, anxiety, and stress [11, 14]. With the exception of general psychological distress, which comprises all 21 items, all three subscales had seven items each. Each construct is measured with four-point Likert scale (0–3) representing frequency, where 0 represents “never,” 1 represents “sometimes,” 2 represents “often,” and 3 represents “almost always.” Based on the total number of items on each subscale, the total subscale scores range from 0 to 21 [15]. Multiplying each of the subscale scores by 2 gives a score similar to that of the DASS-42 [15]. Depressive symptoms were considered normal for scores of 0–9, moderate for scores of 10–13, severe for scores of 14–20, and extremely severe for scores of 20+. The stress subscale ranges are 0–14, 15–18, 19–25, 26–33, and 34+, with 0–14 indicating normal symptoms, 15–18 indicating mild symptoms, 19–25 indicating moderate symptoms, and 26–33 indicating severe symptoms [16]. Anxiety scores of 0–7 indicate fairly normal anxiety, 8–9 indicate mild anxiety symptoms, 10–14 indicate moderate anxiety symptoms, and 15–19 indicate severe anxiety symptoms [16].

The instrument has been translated into over fifty different languages and has been shown to be valid for assessing the constructs of depression, anxiety, and stress [17]. However, the construct of general psychological distress was also reported [18]. This confirms the existence of a two-factor model in its construct. DASS-21 has been psychometrically tested in diverse populations, including various racial groups with internal consistency ranging from 0.74 to 0.84 [19], clinical groups, and communities, with equally acceptable concurrent validity and internal consistency reliability [20], and nonclinical samples of adults (0.80–0.91) for the three constructs of depression, anxiety, and stress

[17]. Similarly, it was found to have internal consistencies of 0.72, 0.72, and 0.76 for depression, stress, and anxiety among the Internally Displaced Persons [18]. For this study, the Arabic and English versions were used. Finally, the four respective constructs in this cohort had an internal consistency of 0.82, 0.72, 0.61, and 0.50 for general psychological distress, stress, depression, and anxiety, respectively.

2.3. Ethical Considerations. Ethical approval was obtained from the Institutional Review Board of Jouf University with reference number 6-11-44. The study was carried out in accordance with the Declaration of Helsinki and in strict compliance with its principles. All subjects participating were provided with the necessary information about the study to provide informed consent and had the right to terminate participation at any time without penalty.

2.4. Data Analysis. The statistical software IBM SPSS version 20 (IBM Corp., Armonk, NY, USA) was used for data analysis. The level of significance was set at $p < 0.05$. Age, sex, marital status, employment status, and educational status were analysed using descriptive statistics of frequencies and percentages. Multiple regressions using the standard method were used to evaluate the predictive relationship between the independent variables (age, sex, marital status, education, and employment) and the dependent variables (symptoms of depression, anxiety, stress, and general psychological distress). The analysis was carried out based on the domains of DASS-21, so four different regression analyses were carried out and are presented as models 1, 2, 3, and 4. The results are presented as unstandardized coefficients (B) with standard error (SE), confidence intervals, R^2 values, and significance values.

Due to the categorical nature of marital status and employment, dummy variables were created. Age and education were treated as continuous variables because they were categorical variables with five levels of ordering. The three outcome variables of depression, anxiety, and stress symptoms were treated as categorical variables. Preliminary analyses were conducted to ensure the assumptions of linearity, homoscedasticity, and normality using scatter plots and residuals [21].

The Q-Q plot was examined for kurtosis and skewness to determine whether the data were normally distributed. A rectangular distribution of residuals against the predicted value was used to assess the assumption of homoscedasticity [22]. Several other checks were conducted, including the adequacy of the samples, the assumption of singularity, multicollinearity, and correlation examination.

Data cleaning was conducted for the entered data to identify any discrepancies between them and the raw data and ensure the accuracy of the analysis [23]. The data were checked against a printout for five datasets and were compared with descriptions when systematic errors were detected to identify missing data. The mean, standard deviation, frequencies, minima, and maxima were used to determine extreme values for continuous variables.

Incorrect data entries were indicated by unexpectedly low values in the minimum column [24]. The questionnaires were kept confidential in one drive.

3. Results

The majority of the study population was between 35 and 44 years old. A bachelor's degree was the most widely reported qualification of the nurse managers. High proportions of the participants were Saudi nationals (93.6%), married (77.1%), and employed full time (92.7%) (Table 1).

As shown in Table 2, multiple regression analysis was utilized to assess levels of anxiety, stress, depression, and general psychological distress after controlling for age, sex, marital status, education, and employment status. Models 1, 2, 3, and 4 showed variance of 8.0, 3.8, 9.4, and 8.7 for anxiety, depression, stress, and general psychological distress, respectively. However, only stress and general psychological distress reached statistical significance. The only variable that made a significant contribution to the development of anxiety was the level of education ($B = -1.60$, SE 0.62, 95% confidence interval (CI) $-2.83, -0.38$, $p < 0.05$). Individual nationality ($B = 2.48$, SE 1.07, 95% CI 0.35, 4.61) and educational level ($B = -1.78$, SE 0.78, 95% CI $-3.32, -0.25$, $p < 0.05$) were predictors of stress. Finally, education had predictive power for general psychological distress ($B = -4.83$, SE 1.79, 95% CI $-8.38, 1.28$, $p < 0.05$).

4. Discussion

To our knowledge, this is the first study to look at the psychological profile of nurse managers in the post-COVID-19 era in KSA. Factors that can contribute to the development of mental health problems among nurse managers were also examined. This study shows that stress and general psychological distress appear to be the most common problems among nurse managers in the healthcare sector. The individual level of education was the only significant predictor of anxiety, stress, and general psychological distress. It was also found that the nationality of the nurse managers correlated with stress.

Corroborating with similar studies, evidence have shown that healthcare professionals suffer from a range of mental health problems due to a lack of equipment and work overload, which may have an impact on the quality of care [25, 26]. This study found that educational level and individual nationality contribute to the development of stress, while education alone has predictive power for general psychological stress. Education has been shown in the literature to be a significant predictor of mental health (depression, anxiety, and stress) [25, 27]. In other words, marital status, gender, and monthly working hours were significant predictors of mental health [25]; however, they were not in this study. Therefore, further quantification is needed.

Stress has been reported to be a common problem among nurses and may be due to staff shortages, poor working conditions, inadequate management support, and

TABLE 1: Demographics.

No	Variables	Frequencies (%)	M (SD)
1	<i>Age</i>		3.04 (0.77)
	25–34	30 (27.5)	
	35–44 years	45 (41.3)	
2	<i>Educational levels</i>		1.13 (0.34)
	Degree (Bachelor's)	95 (87.2)	
	Postgraduate (masters)	14 (12.8)	
3	<i>Marital status</i>		1.92 (0.72)
	Single	21 (19.3)	
	Married	84 (77.1)	
4	<i>Employment status</i>		1.17 (0.64)
	Divorced	4 (3.7)	
	Full-time	101 (92.7)	
5	<i>Nationality</i>		1.06 (0.25)
	Self-employed	5 (4.6)	
	Locum contract	3 (2.8)	
	<i>Nationality</i>		
	Saudi	102 (93.6)	
	Non-Saudi	7 (6.4)	

TABLE 2: Summary of the multiple regression analysis to predict the level of anxiety, stress, depression, and general psychological distress with age, sex, nationality, education, and employment status.

Variable	B	SE B	95% CI	R ²	p-value
Model 1 (DASS-21-anxiety subscale)					
Constant	11.72	1.19	9.37, 14.08	0.080	0.066
Nationality	1.35	0.86	−0.35, 30.04		<0.001
Marital status	0.15	0.54	−0.91, 1.21		0.12
Education	−1.60	0.62	−2.83, −0.38		0.78
Employment	−0.150	0.80	−1.74, 1.44		<0.05
Model 2 (DASS-21-depression subscale)					
Constant	12.44	1.46	9.55, 15.33	0.038	0.85
Nationality	0.224	1.05	−1.86, 2.30		0.395
Marital status	−0.04	0.66	−1.34, 1.27		0.83
Education	−1.444	0.756	−2.94, 0.06		0.96
Employment	0.612	0.983	−1.34, 2.56		0.06
Model 3 (DASS-21-stress subscale)					
Constant	10.64	1.49	7.68, 13.60	0.094	<0.05
Nationality	2.48	1.07	0.35, 4.61		<0.001
Marital status	0.67	0.67	−0.67, 2.0		<0.05
Education	−1.78	0.78	−3.32, −0.25		0.32
Employment	0.04	1.01	−1.96, 2.03		<0.05
Model 4 (DASS-21-general psychological distress)					
Constant	34.81	3.45	27.97, 41.64	0.087	0.97
Nationality	4.05	2.48	−0.87, 8.97		<0.05
Marital status	0.78	1.55	−2.30, 3.87		0.11
Education	−4.83	1.79	−8.38, 1.28		0.62
Employment	0.50	2.32	−4.11, 5.11		<0.05

Note. CI: confidence interval; B = unstandardized beta; SE B: standard error of beta. (N = 109).

high workload [28]. Furthermore, an association has been found among nurses between COVID-19-related work stressors and psychological distress [29–31]. Studies have also reported that nurses with lower educational qualifications are more stressed than those with higher qualifications [32]. The literature also shows that a lower level of

psychological stress can be correlated with a higher level of education, and vice versa [33]. Anxiety is also widespread among nurses with lower academic qualifications [34].

The emergence of COVID-19 has posed a threat to the health system and led to structural, environmental, and administrative changes or requirements that have continued

into the post-pandemic period. Therefore, the stress and general psychological distress in this study are not unusual. Evidence has shown that chronic stressors have affected people worldwide and across all sections of society, and without a doubt, the COVID-19 pandemic has been a contributing factor [35]. As a result, it may have provoked a crisis of unprecedented proportions in public mental health [35, 36].

The COVID-19 interventions have required all people to stay indoors and maintain physical distance in any situation (including in hospitals) or when they are out for any purpose [36]. The prevalence of common mental disorders such as depression, anxiety, and stress has been expected to increase in the post-COVID-19 pandemic period due to the long-term effects of restrictive measures such as quarantine and social distancing, as well as the socioeconomic consequences [37]. In an event of such magnitude as the pandemic, the impact on mental health can be long-lasting [37].

Physical and emotional exhaustion and fear of infection among nurses further aggravate their fears [38]. There has been a huge impact on people's mental health as well as on all current activities as a result of the aforementioned interventions [36]. In particular, positive mental health outcomes were associated with organizational support, readiness, safety, and materials and resources [38]. Evidence has shown that the health consequences of nurse management may be similar to those faced by front-line nurses [38].

The COVID-19 pandemic posed a resource challenge for many institutions, and nurse managers had the responsibility of managing human and equipment resources [38]. Nursing care managers in particular are responsible for making decisions regarding staff and patients, planning care, and supervising the nurses who provide this care [38]. They may have been impacted by uncertainty related to COVID-19 management because practical measures were constantly changing.

In KSA, nurse managers comprise both local people and expatriates. However, a study has shown that occupational stress is widespread among expatriates [39]. Therefore, it should not be surprising that stress is reportedly associated with nationality. Furthermore, psychological distress, anxiety, and stress are significantly correlated with education. This result is in line with the study by Golubic and colleagues [32], who found that nurses with a lower level of education experienced more stress at work compared to those with a college degree. A lower level of education could also be correlated with the development of anxiety, and according to Bjelland et al. [40], a higher level of education appears to protect against anxiety.

Similarly, studies have shown that there is a positive correlation between higher education and lower psychological stress [33]. The level of education alone could be a predictor of general psychological distress. Therefore, it is not surprising that general psychological distress is

significantly correlated with educational levels in the present study. Notably, only 12.8% of the study participants had post-graduate degrees.

4.1. Limitations. One of the limitations of this study is that the sample size was small, which could limit the generalizability of the results. Furthermore, the cross-sectional nature of this study limits our ability to infer causality and provides only a partial picture of the situation. As data were collected using a self-report questionnaire, the results cannot be interpreted with certainty. Therefore, an in-depth study using a mixed methods design that incorporate a qualitative component should be carried out to find out more about the mental health problems associated with COVID-19.

5. Conclusion

Although this study had limitations, it contributes to our understanding of mental health outcomes. Stress and general psychological distress appear to be the main mental health problems among nurse managers. It was also found that individual nationality and level of education play important roles in the development of anxiety, stress, and general psychological distress. The results of this study can raise nurse leaders' awareness of the levels of anxiety, stress, and depression and help to provide psychological support programs to improve nurses' mental health during the pandemic. Therefore, policy makers should develop a blueprint for monitoring the mental health of facility managers in public health facilities. Furthermore, healthcare institutions should ensure that more professionals with higher education be appointed as care managers. Managers should delegate tasks to junior staff as a strategy to deal with some work-related stressors.

Data Availability

Data for this study are available from the corresponding author upon reasonable request.

Additional Points

Copyright and Permissions. The DASS questionnaire is public domain and so permission is not needed to use it according to the developers available at https://www2.psy.unsw.edu.au/groups/dass/DASSFAQ.htm#_3.__How_do_I_get_permission_to_use.

Conflicts of Interest

The author declares that there are no conflicts of interest with respect to the publication of this article.

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Research Article

Regional Variation in the Community Nursing and Support Workforce in England: A Longitudinal Analysis 2010–2021

Beth Parkinson ¹, Nicky Cullum ², Matt Sutton ¹, Katherine Checkland ¹,
Peter Bower ¹, Donna Bramwell ¹, and Rachel Meacock ¹

¹Division of Population Health, Health Services Research and Primary Care, School of Health Sciences, University of Manchester, Manchester, UK

²Division of Nursing, Midwifery and Social Work, School of Health Sciences, University of Manchester, MAHSC, Manchester University NHS Foundation Trust, Manchester, UK

Correspondence should be addressed to Beth Parkinson; beth.parkinson@manchester.ac.uk

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Introduction. Shifting care from hospitals into community-based settings is a major policy goal internationally. Community health services in England currently face the greatest workforce shortages of all sectors, threatening the feasibility of this policy. Moreover, little is known about the extent of variation in community workforce provision regionally and how this relates to determinants of need. **Aim.** To analyse regional variation in the community services workforce in England between 2010 and 2021. **Methods.** We obtained NHS workforce statistics data on the number of nurses and nursing support staff providing community services at each NHS organisation in England, from March 2010 to November 2021. We aggregated the organisation-level data to both regional and national levels, which enabled us to maintain consistent units of analysis across the decade. To examine longitudinal trends and regional variation in workforce provision, we calculated the number of staff per 100,000 population aged 65+ in each region and each period. We then graphed and summarised the variation and examined the correlations with levels of deprivation and rurality. **Results.** There was a twofold variation in community services workforce provision between English regions. In November 2021, the number of staff per 100,000 people aged over 64 ranged from 300 in the South West to 697 in the North West. Most regions experienced a reduction in provision between 2010 and 2021, with a 21.2% reduction nationally. East of England experienced the largest reduction of 39.3%, whilst London experienced a 2.1% increase. In November 2021, regions with more deprived populations had higher workforce provision and regions with a larger proportion of residents living in rural areas had lower workforce provision. **Conclusions.** The size of the community services workforce has fallen relative to population needs, contradictory to the policy priority to enhance care in the community. There was substantial regional variation in the size of the workforce, which has persisted throughout the decade. Workforce provision was higher in more deprived areas but lower in rural areas, potentially impacting equitable access in rural areas.

1. Introduction

Healthcare workers have a fundamental role in the functioning of health systems, yet it is predicted that there will be a global shortage of 18 million health workers by 2030 [1]. England's National Health Service (NHS) is facing the greatest workforce crisis of its history [2], with workforce shortages across all health and care system staffing groups putting services under significant strain. The biggest shortfall

of staff is seen in nursing [3, 4], and recent figures have shown that the number of nurses leaving the NHS is at an all-time high [5].

Within the NHS in England, the adult community nursing workforce plays a crucial role in addressing the population's health needs in their homes and local communities, ideally reducing the need for hospital admission. They contribute to the provision of a diverse range of services, including long-term condition management,

reablement, wound care, and palliative care. Community health services currently account for approximately 10% of the NHS budget and deliver 100 million patient contacts each year [6].

In line with the goals of health systems internationally, the NHS Long Term Plan reaffirmed the long-standing policy objective of shifting care from hospitals to community-based settings [7], to be achieved by strengthening the provision and efficiency of community services. Moreover, the Fuller report envisages an important role for community nursing services in delivering more integrated care, working with staff in primary care to deliver a wider range of integrated services outside hospitals [8].

An effective community care workforce is required to deliver these plans. Due to the range of services provided by community health services, the workforce is comprised of a range of healthcare professionals, with 73% of those providing direct patient care being nurses and related nursing support roles [9]. However, community health services have been identified as the area experiencing the greatest shortage of nurses in England [10]. Whilst the number of full-time equivalent (FTE) registered nurses working in adult hospital care has increased by around 24% between 2011 and 2021, the number working in community nursing and health visiting has declined by 7% over the same period [11], with the number of community matrons and district nurses declining by 47% [12]. The challenges facing community nursing are so great that they have led to the development of a forthcoming strategic national community nursing plan aiming to strengthen capacity in the community nursing workforce [13]. This forthcoming plan is, however, much delayed.

Whilst the extent of community nursing workforce shortages has been assessed at a national level [11, 12], little is known about how workforce provision varies across the country. Equitable provision of health care is central to the founding principles of the NHS. In recent years, the NHS has committed to stronger action on health inequalities [7], by addressing unwarranted variation in healthcare provision and the relative disparities in access to services [14]. However, the vast majority of research to date has focused on primary and secondary care, with very little evidence on community health services [15]. Inequalities in the regional distribution of the community services workforce could prevent equitable access to services, impact patient experience and outcomes, and widen health inequalities. Regional variation in the community services workforce will also affect the ability of local systems to respond to the policy requirements to deliver a greater proportion of care in the community [8]. Examining whether the provision of these services varies across the country is a vital first step in understanding the sources of variation in care provision.

Social determinants of health are widely recognised as key drivers of health outcomes, health inequalities, and increased healthcare expenditures [16, 17], with environmental and socioeconomic determinants often shown to be the most influential factors determining health [18, 19]. The NHS aims to distribute the resources available to deliver care across geographical areas in a way that takes into account

such differences in the need for care [20]. Therefore, examining whether the regional variation in the community services workforce is associated with known drivers of need will provide important data to facilitate the development of meaningful workforce plans, which take account of local needs. We would expect to see higher workforce numbers in areas of deprivation or rurality if services are provided according to need, for example, because people living in rural areas have a higher reliance on community care due to difficulty accessing other healthcare services [21].

In this study, we aim to analyse the trends over time in the size of the community nurse and nursing support workforce in the English NHS between 2010 and 2021. Second, we aim to examine the extent of regional variation and whether this variation is related to two expected determinants of population need: deprivation and rurality [15, 16]. We focus on community nurses and the related nursing support workforce providing community health services to adults, as these services face increasing demands both from an ageing population with increasingly complex healthcare needs and from the introduction of new care models designed to boost out-of-hospital care [7, 22]. Therefore, this analysis will highlight areas with less adequate staffing and ones which may require specific remedial support. This will also give further insights into the factors affecting the ability of the NHS to meet its commitments to tackle inequalities in access to care and provide insights into potential targets for intervention, such as targeted recruitment and regional schemes to attract new staff [23].

2. Materials and Methods

2.1. Research Design. To examine the trends in the scale and regional variation in community nursing and nursing support workforce provision, we conducted a descriptive longitudinal study. The units of analysis were the whole of England or the seven NHS Commissioning Regions. The analysis presented in this study is part of a larger study aiming to better understand community services in the English NHS and their role in avoiding hospital admissions [24]. The analysis was designed by all authors in consultation with our patient and public involvement panel and following discussions with stakeholders in NHS England.

2.2. Data

2.2.1. Workforce. We obtained data from NHS Digital on the number of FTE nurses and nursing support staff listed as delivering community healthcare services, employed by each NHS organisation in England. The data cover the period from 31 March 2010 to 30 November 2021. Data are available on a quarterly basis for the first seven years of the series (31 March 2010 to 31 March 2017) and monthly thereafter (30 April 2017 to 30 November 2021).

The data are taken from NHS workforce statistics, which are extracted from the NHS human resources and payroll system [25]. It is possible that NHS organisations have opened, closed, or merged over the study period, with staff being transferred between organisations. We aggregated the

organisation-level data to both regional and national levels, which enabled us to maintain consistent units of analysis across the decade. Regions were classified as the seven NHS England commissioning regions [26].

The NHS workforce statistics data contain the number of FTE staff employed at all NHS organisations working in the speciality of community services. The data contain two main staff groups: “Nurses and health visitors” and “Nursing support staff,” distinguishing between registered and un-registered nursing staff. Registered nurses are clinically qualified healthcare practitioners on the Nursing and Midwifery Council register who have graduated from an accredited training programme [27]. Registered nurses coordinate, plan, and deliver patient care. Nursing support staff include Healthcare Assistants and Nursing Associates, who assist clinical staff in the care of patients, but who do not have professional registration. Due to this study’s focus on community services provision for older adults, we excluded nursery nurses, children’s nurses, and health visitors as these roles provide services exclusively for children. We also excluded nurses and nursing support staff working in the specialities of Community Learning Disabilities and Community Mental Health services as they serve different populations.

Independent Healthcare Providers play a significant role in the community health service sector in England, but data from non-NHS providers are sparse. To determine the size of the workforce delivering care outside of the NHS, we obtained data from NHS Digital on the number of nurses and nursing support staff working at Independent Healthcare Providers. This data collection began more recently and is therefore only available for the period of 30 September 2015 to 30 September 2021. Data for staff employed by Independent Healthcare Providers are only collected at six-month intervals throughout the series. Due to the way that the data are collected and the data sharing agreements in place, it is not possible to attribute this workforce to regions, so we presented this at the national level only.

2.2.2. Population Statistics. We obtained midyear population estimates of the usual resident population in an area covered by each Clinical Commissioning Group in England from the Office for National Statistics, for the period 2010 to 2020 [28]. Clinical Commissioning Groups were clinically led statutory NHS bodies responsible for the planning and commissioning of healthcare services for their local area. We interpolated these midyear estimates linearly between years to generate estimates for all quarters or months, to correspond with the workforce data availability. Population figures for 2021 were not yet available at the time of writing, so we used estimates from 2020. Clinical Commissioning Groups were assigned to NHS regions using mappings from the Office of National Statistics [29]. From these, we calculated annual counts of the population aged 65+ residing in each NHS region and nationally. This population was chosen because contact rates with community staff increase significantly following age 65, with this being the primary population served by the adult community workforce we examine [30].

2.2.3. Deprivation and Rurality. For each region, we calculated the proportion of the region’s aged 65+ population that lives in the most deprived quintile of lower layer super output areas in England, based on the index of multiple deprivation [31]. England is divided into 32,844 lower layer super output areas (LSOAs), which represent a geographical hierarchy designed for the reporting of small area statistics, with a mean population of 1,500 [32]. We then linked LSOAs to Clinical Commissioning Groups, which were then assigned to NHS regions using mappings from the Office of National Statistics [29]. We also calculated the proportion of a region’s aged 65+ population that lives in rural areas using the rural-urban classifications of LSOAs [33]. Urban areas are defined as the connected built-up areas identified by Ordnance Survey mapping that have resident populations above 10,000 people, and rural areas are those with fewer than 10,000 people or are open country side [34].

2.3. Data Analysis. To examine how the size of the national community service nursing and nursing support workforce has changed over the decade, we presented the longitudinal trends graphically and using summary statistics. We first examined the longitudinal trend over time in the total FTE NHS adult community nurse and nursing support workforce nationally, from March 2010 to November 2021. To examine whether the numbers of nurses and nursing support staff have kept pace with population growth, we also examined this longitudinal trend per 100,000 population aged 65+.

To examine the scale and regional variation in workforce provision, we then presented longitudinal trends in the total FTE NHS nurse and support workforce per 100,000 population aged 65+ in each of the seven NHS regions. This indicates how regional workforce capacity has changed over time, accounting for the size of the populations served.

We presented the number of adult community nurses and nursing support workforce at Independent Healthcare Providers nationally, in terms of both the total FTE and FTE per 100,000 population aged 65+.

Finally, at the regional level, we examined the relationship between the size of the community nurse and nurse support workforce (adjusted for the size of the region’s population aged 65+) and two expected determinants of the population need: the level of deprivation and rurality. Specifically, we estimated Pearson’s correlation coefficients between the number of FTE community nurses and nursing support staff per 100,000 population aged 65+ and (i) the proportion of a region’s aged 65+ population that live in the most deprived quintile of national LSOAs and (ii) the proportion of a region’s aged 65+ population living in a rural area. The size of the FTE workforce observed at our most recent time point, 30 November 2021, was used in these analyses. We also used univariate linear regressions to estimate the association between the size of the community services workforce and (i) the level of deprivation and (ii) the level of rurality. From these regressions, we then calculated the expected level of workforce per aged 65+ population for each region given its level of deprivation or rurality.

3. Results

3.1. National Trends in Community Nursing and Nursing Support Staff Workforce. Figure 1 presents the national trends in the number of FTE adult community nurses and nursing support staff employed in NHS organisations from March 2010 to November 2021 (raw numbers and per 100,000 population aged 65+). The size of the workforce decreased substantially during the first half of the decade, with a reduction of 7,400 (14%) total FTE staff between March 2010 and its lowest point in June 2015. When accounting for changes in the size of the older population served, there were 608 FTE staff per 100,000 population aged 65+ in March 2010 (Table 1). This fell by 24.7% to 458 staff per population by June 2015.

Whilst the number of staff started to rise during the second half of the decade, the growth in the size of the workforce since its low point in 2015 did not keep pace with population growth. As of November 2021, there was an average of 480 staff employed per population (Table 1). This figure is 21.2% lower than at the start of the series in March 2010.

In September 2015, Independent Healthcare Providers recorded employing a total of 5,450 FTE nurse and nursing support staff in adult community health service roles, equivalent to 56 FTE per 100,000 population aged 65+ nationally. This means that the size of the workforce reported by Independent Healthcare Providers was approximately 12.2% of the 459 staff per population employed by NHS organisations in September 2015. The number of staff employed by Independent Healthcare Providers had increased by 9% to 61 staff per population nationally in September 2020, which is equivalent to 13.1% of the 465 staff per population employed by NHS providers on that date.

3.2. Regional Trends in Community Nursing and Nursing Support Staff Workforce. There are stark regional differences in the size of the community nursing and nursing support workforce (Figure 2). Every year, there was around a twofold difference between some regions in the number of FTE staff employed per 100,000 population aged 65+. As of November 2021, there were 697 staff per population in the North West compared with just 300 in the South West of England (Table 1).

Regions experienced relatively similar rates of growth in the size of the population aged 65+ (Table 1, column 6), but much more variable changes over time in FTE staff numbers (Table 1, column 3). Regions therefore experienced vastly different trends in workforce per population over the period we examined. Most regions experienced a fall in staff in the first half of the decade to various extents (Figure 2), as seen in the national trends (Figure 1). However, London did not experience this initial drop, with workforce numbers instead staying relatively stable up until 2017 when they began to increase, resulting in a 2.1% increase in workforce per population across the period we examine. Conversely, the East of England experienced the most dramatic drop in workforce numbers at the start of the decade, with workforce

numbers then remaining low for the rest of the period. The size of the workforce in the East of England fell from 542 to 329 staff per population between 2010 and 2020, representing a 39.3% reduction in workforce provision. London was the only region where the size of the workforce kept pace with the growth in the size of the older population served. All other regions saw reductions in the size of their workforce per population over the period we examine, ranging from -15.4% in the North West to -39.3% in the East of England.

3.3. Regional Workforce and Deprivation. Deprivation levels vary substantially across the regions of England. In the South East, 5.8% of the population aged 65+ reside in the most deprived quintile of national LSOAs, compared to 26.2% of the aged 65+ population in the North West (Table 1). There was a strong positive correlation between the regional FTE workforce per 100,000 population aged 65+ and the proportion of this older population living in the most deprived LSOAs (Pearson's correlation coefficient = 0.81, p value: 0.028), as of November 2021. Regions with a greater proportion of their aged 65+ population living in deprived areas had higher levels of staffing (Panel 1, Figure 3), as demonstrated by the strong positive gradient observed in the line of best fit. Most regions fit this trend relatively closely except London and the North East and Yorkshire. London has 198 more staff per population than expected from the univariate regression, whilst the North East and Yorkshire has 82 fewer staff per older population than expected given the region's deprivation levels.

3.4. Regional Workforce and Rurality. The proportion of people residing in rural areas also varies across the regions of England. In the predominantly urban region of London, just 0.3% of the population aged 65+ reside in a rural area (Table 1). The South West has the highest levels of rurality, with 37.7% of the population aged 65+ residing in a rural area. There was a strong negative correlation between the regional FTE workforce per 100,000 population aged 65+ and the proportion of the older population living in rural LSOAs, as of November 2021 (Pearson's correlation coefficient = -0.88, p value: 0.008) (Panel 2, Figure 3). The East of England and the South West are the two most rural areas, with over one-third of their older populations living in rural LSOAs. These regions had just under half the workforce per population compared to the two least rural regions, London and the North West.

4. Discussion

4.1. Summary of Findings. Nurses play a vital role in promoting equitable and essential care, yet workforce shortages and inequitable geographical distributions of staffing pose challenges for health systems across the globe [35]. Most evidence to date has focused on understanding the nursing workforce in acute settings rather than nursing in the community. An effective community nursing workforce is required to support the delivery of the new models of care designed to enhance care provided outside of hospital, yet

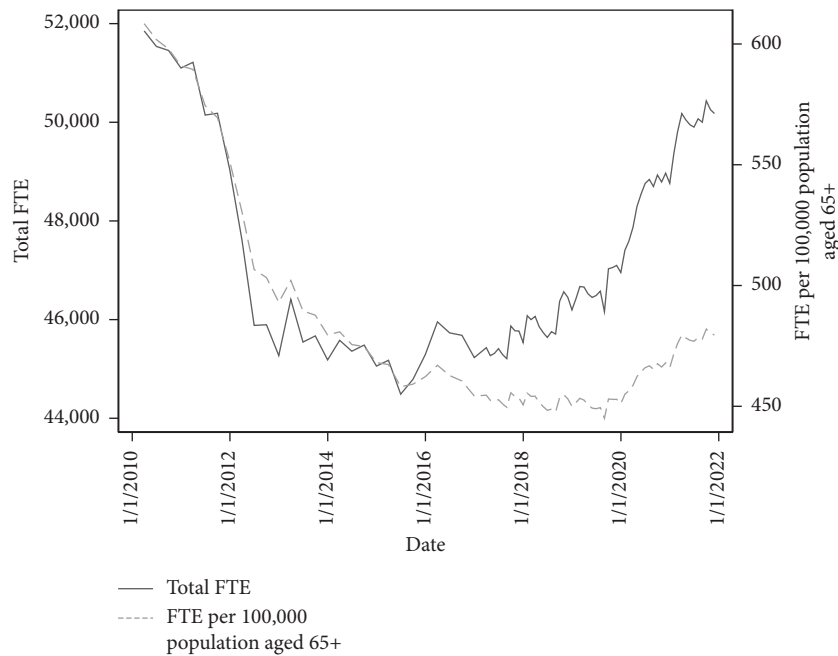


FIGURE 1: National trends in adult community nurse and nursing support workforce, total FTE, and FTE per 100,000 population aged 65+.

little is known about trends in the community services workforce within the English NHS and how this varies across the country. Our analysis demonstrates how the community nurse and nursing support staff workforce has changed over time in England, how it varies regionally after accounting for the size of the potential populations served, and how workforce provision is related to two factors expected to reflect higher levels of need amongst the population: deprivation and rurality.

There was a significant decline in the first half of the decade in the number of nurses and nursing support staff providing adult community health services in NHS organisations. Although there was growth in staffing in the later part of the decade, the number of FTE staff was still lower in 2021 than in 2010 after adjusting for the size of the population aged 65+ served. The growth in the size of the workforce since its plateau in mid-2015 has failed to keep pace with population growth, resulting in 21% fewer FTE staff per population at the end of the series in November 2021. In addition to population growth, patient complexity and need are also known to have increased during this period [36], meaning that the demands placed on the workforce have likely grown even further than is reflected by simple population counts.

Some of this initial decline may have been a result of the “Transforming Community Services” programme, which was implemented in March 2011 and required Primary Care Trusts (PCTs) to separate their provider and commissioning responsibilities for community services [37]. In response, the provision of community services was transferred to a range of organisations. The majority was transferred to NHS organisations through the creation of standalone NHS Community Trusts or merged with existing Acute or Mental Health NHS Trusts. The remainder was transferred to

organisations outside of the NHS, such as voluntary and independent sector providers [38]. However, the resulting shift of some staff to Independent Healthcare Providers is unlikely to have been large enough to fully explain the decline seen within NHS organisations. Whilst we do not have data on the Independent Healthcare Provider workforce before September 2015, we find that the total size of their community nurse and nursing support workforce recorded is just 12% of the NHS workforce during the period we can observe, at around 5,450 FTE staff in September 2015. The recorded Independent Healthcare Provider workforce was therefore not large enough to account for the observed reduction of 7,400 FTE staff employed by NHS organisations from March 2010 to June 2015.

We find stark variations in the levels of adult community nurses and nursing support workforce in different areas of the country. There was a twofold difference in the number of FTE staff between regions after controlling for the size of the older populations they serve. Regions also experienced different trends in their workforce over the series. Whilst staffing levels per 100,000 population aged 65+ remained relatively consistent across the series in London, this was the only region not to experience a decline in the size of its NHS workforce after adjusting for population growth. FTE adjusted for population size was 2.1% higher in London at the end of the series, whereas the East of England experienced a reduction of -39.3% in the size of its population-adjusted workforce.

Regional variations in the size of the adult community nurse and nursing support workforce are strongly patterned according to the level of deprivation experienced by the regions’ populations. Deprivation is a key determinant of community service need [30], so this suggests that regional variations are warranted as they correlate closely with this

TABLE 1: Community nurse and nursing support staff workforce and population size and characteristics.

Region	FTE staff			Population aged 65+			FTE staff per 100,000 population aged 65+			The proportion of aged 65+ population living in rural areas in November 2021	
	Mar 2010	Nov 2021	Change (%)	Mar 2010	Nov 2021	Change (%)	Mar 2010	Nov 2021	Change (%)		
East of England	5,609.23	4,260.93	-24.04	1,035,031	1,295,979	25.21	541.94	328.78	-39.33	7.50	34.92
London	5,804.98	7,284.70	25.49	893,928	1,098,453	22.88	649.38	663.18	2.13	13.08	0.26
Midlands	9,977.09	10,277.59	3.01	1,661,849	2,030,374	22.18	600.36	506.19	-15.69	16.87	25.94
North East and Yorkshire	10,742.15	9,160.58	-14.72	1,428,503	1,681,146	17.69	751.99	544.90	-27.54	23.16	24.03
North West	8,724.48	9,167.87	5.08	1,059,811	1,316,247	24.20	823.21	696.52	-15.39	26.17	11.37
South East	6,659.30	6,210.24	-6.74	1,424,852	1,770,422	24.25	467.37	350.78	-24.95	5.83	24.86
South West	4,334.71	3,815.70	-11.97	1,018,242	1,271,398	24.86	425.70	300.12	-29.50	7.37	37.68
England total	51,851.94	50,177.60	-3.23	8,522,216	10,464,019	22.79	608.43	479.53	-21.19	14.47	23.46

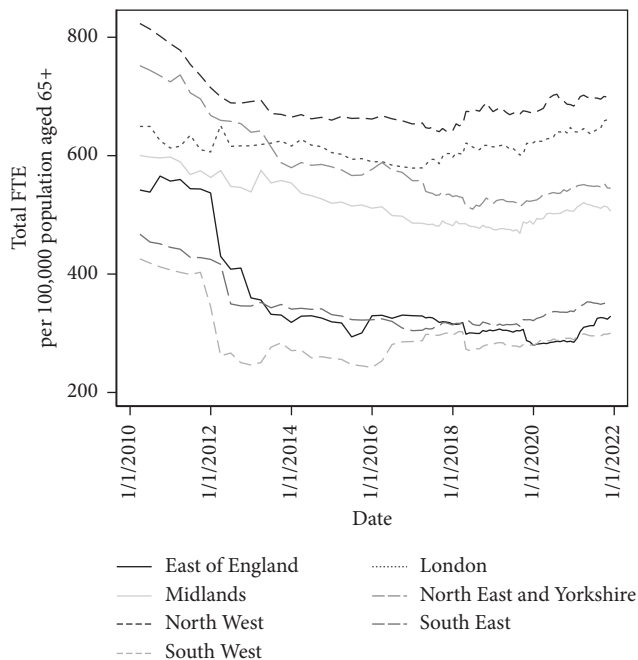


FIGURE 2: Regional trends in adult community nurse and nursing support workforce, FTE per 100,000 population aged 65+.

indicator of need. However, the magnitude of this difference is striking and is contrary to the inverse care law, which has been shown to exist in many other care settings [39]. For example, the provision of general practitioners in an area has previously been found to be inversely related to the deprivation of the population [40]. This suggests that, unlike other healthcare sectors, the community workforce aligns better with deprivation, at least at the regional level. There are also some regions for which this variation is not well explained. London, for example, appears to be an outlier to this trend, having a much higher FTE workforce per population relative to its deprivation levels. This would suggest London may be most able to prioritise the expansion of community services following the recent policy agenda.

Whilst workforce provision follows a positive relationship with levels of deprivation, we find that regional variations are inversely related to rurality. This is in part because deprivation and rurality are themselves moderately negatively correlated. However, if rurality was independently positively associated with workforce provision, we would not expect the regional variation to follow deprivation levels only. A survey of community nurses found that teams serving predominantly rural areas covered an average area of a 17-mile radius compared to 10 miles in urban areas [41]. It has therefore been argued that rural areas require more staffing to account for additional travel distances and the resulting lower proportion of overall time spent with patients associated with serving more remote areas and dispersed populations [42]. Furthermore, people living in rural areas have a higher reliance on community care due to difficulty accessing other healthcare services [21]. However, we observe the opposite relationship when examining workforce provision across England; the two regions with

the largest provision of adult community nurses and nursing support workforce per head are those with the lowest proportion of their older population living in rural LSOAs. Our results suggest that populations in rural areas may face inequalities in access to, and provision of, adult community services. This in turn could compound the inequalities in access to other healthcare services known to exist in rural areas, particularly in secondary care, with travel time to the nearest hospital double for people residing in rural compared to urban areas [21].

4.2. Comparison with Previous Research. We are not aware of any published analyses of the regional variation in the distribution of the adult community nurse and nursing support workforce. Our findings are, however, in line with existing research that has demonstrated the existence of inequalities in the distribution of healthcare workers internationally. Studies have demonstrated inequalities in the density and distribution of nurses between countries [43, 44] and at a subnational level within 58 countries [45]. However, these studies did not focus specifically on community nursing. Previous studies have also found substantial subnational geographic variation in the distribution of general practitioners internationally [46–48] and within the English NHS [49, 50]. The previous finding that fewer general practitioners are employed in practices in more deprived areas in England [40] contrasts with the findings of our study, where we find the opposite relationship between adult community workforce provision and deprivation. This suggests that the community workforce may align better with deprivation, in contrast with the primary care workforce.

Previous descriptive analysis of NHS workforce statistics shows that the number of nurses and nursing support staff working in acute adult care settings in NHS hospitals increased by 24% nationally, between December 2011 and December 2021 [11], whilst the number working in either community or health visiting decreased by 7% nationally. However, importantly, these analyses combined adult and children's community services, did not account for population growth, and did not examine regional variations as we did in this study.

Recent studies have assessed the trends in the size and composition of the wider primary care workforce in the English NHS. Between 2015 and 2019, there was a 2.9% increase in the total workforce employed at general practices per 1,000 patients, combined with an expanding skill mix of the general practice workforce [51]. The number of practice nurses per 1,000 patients remained fairly constant, but there was an increase in the number of advanced nurse practitioners [51]. However, this study only examined the primary care workforce from 2015 onwards, which is the period from which we observe the size of the community workforce to begin to increase again following a decrease in the first half of the decade.

The number of staff employed at general practices was also found to vary between regions of England [52]. The lowest number of primary care staff per 1,000 patients was

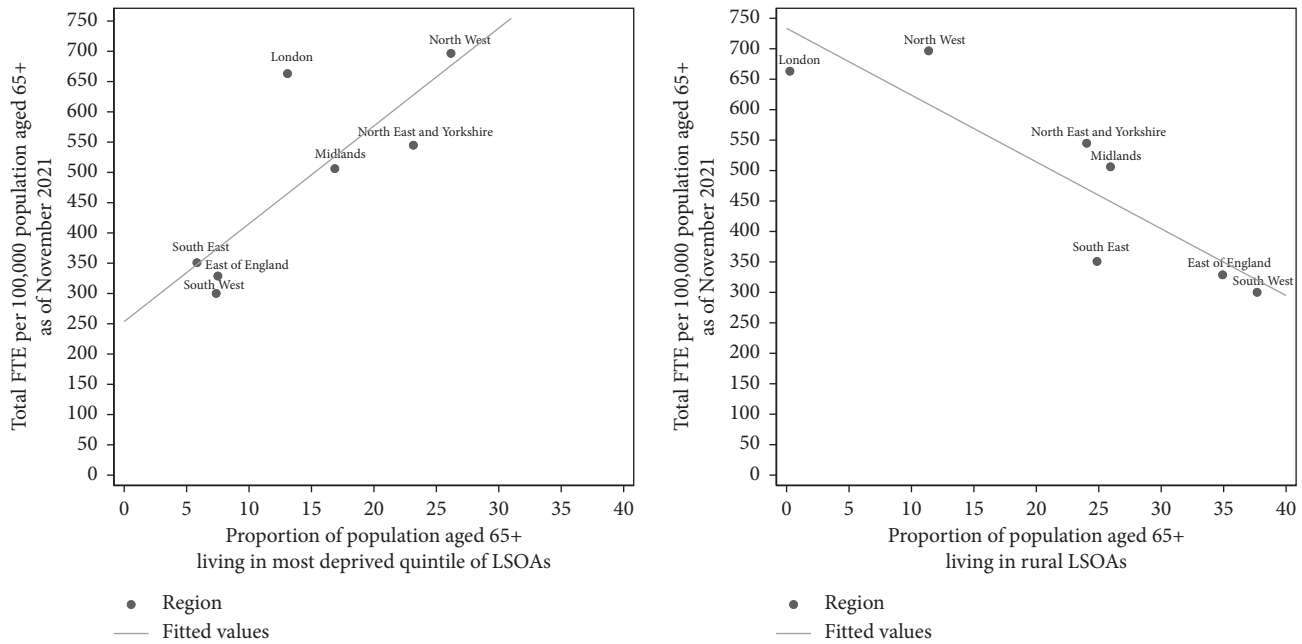


FIGURE 3: Relationship between adult community nurse and nursing support workforce size and deprivation and rurality.

seen in the London and South East regions of England [52]. Whilst we do not examine all types of community health service staffing, we do find the South East to be amongst the regions with the lowest community nurse and nursing support workforce. The regions with the highest number of primary care staff were those in the South West and North East [52]. We also show that the North East of England had levels of community nursing and support staff above the national average.

4.3. Strengths and Limitations. This is the first national and regional analysis of trends in the number of nurses and nursing support staff employed to provide adult community services in NHS organisations in England. Previous research has focused on either the entire NHS nursing workforce employed across all care settings or only subsets of the community services workforce, such as district nursing, and none have assessed regional variations in the community services workforce. None have examined geographical variation, or how provision relates to deprivation and rurality. We have a long time series containing over 10 years of data, which covers several important policy changes implemented in community health care.

Whilst most community healthcare services are provided by NHS organisations, a proportion is provided by Independent Healthcare Providers. We present data on the number of nurses and nursing support staff providing adult community services recorded by Independent Healthcare Providers nationally. These data are not available for the full period that we have access to data from NHS organisations, starting instead from September 2015. Furthermore, there is an agreement with some Independent Healthcare Providers that data will not be disaggregated below the national level; therefore, we are unable to examine the regional differences in community services provision from Independent

Healthcare Providers. It is therefore possible that the regional distribution of the adult community nurse and nursing support workforce employed by Independent Healthcare Providers could explain some of the observed regional variation in the NHS community workforce that we detect. However, the reported size of the workforce employed by Independent Healthcare Providers is not large enough at the national level to explain the reductions in the NHS workforce observed during the period we examine.

Due to how NHS workforce data are collected by NHS Digital, we are unable to capture the wider allied healthcare professional and medical workforce employed in the community setting. However, 73% of clinical staff providing community services are nurses or nursing support staff, so we can capture the majority of the workforce providing care in this setting [9].

5. Conclusions

The size of the community nurse and nursing support workforce has fallen relative to population needs, contradictory to the long-standing policy priority of enhancing care in the community. There was substantial regional variation in the size of the workforce, which has persisted throughout the decade. Workforce provision was higher in more deprived areas, but lower in rural areas.

These results focus on the nursing and nursing support workforce as data on alternative roles such as doctors and allied health professionals were unavailable. However, this remains an important avenue for future research and should be the focus of future data collection efforts. Furthermore, the need for consistent units of analysis required us to aggregate the data to the regional level; however, there may be wider inequalities at smaller geographical area levels [51, 52].

5.1. Implications for Nursing Management. Boosting out-of-hospital care through increased investment in community health services has been a key policy goal of the NHS for several years. Similarly, the NHS Long Term Plan committed to more action on health inequalities by addressing unwarranted variation in care provision. The findings of this study highlight the need for further action towards addressing community health services nursing workforce shortages nationally and particularly in rural regions, where levels of provision are lower than urban counterparts, potentially preventing equitable access for rural populations.

The failure of size of the workforce to keep up with population growth means that the community nursing workforce will be more stretched and under more pressure than ever before. Therefore, the insights gained from this study in terms of the scale and patterns of inequalities can be used by policymakers to effectively plan nurse recruitment and retention programmes and improve the sustainability and equity of community health services.

Data Availability

NHS workforce data are publicly available here, at one level of aggregation higher than we utilise: <https://digital.nhs.uk/data-and-information/publications/statistical/nhs-workforce-statistics>. We were provided with a longitudinal community services specific subset of these data upon request from NHS Digital. All other datasets are publicly available, and sources are cited throughout the manuscript.

Ethical Approval

Study registration: Proportionate University Research Ethics Committee (UREC) approval granted from The University of Manchester UREC. Registration number: 2022-15310-25431.

Disclosure

The views expressed in this publication are those of the author(s) and not necessarily those of the National Institute for Health and Care Research or the Department of Health and Social Care.

Conflicts of Interest

The authors declare that they have no conflicts to interest.

Acknowledgments

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Research Article

The Registered Practical Nurse (RPN) Role in an Academic Acute Care Hospital: A Mixed Method Study of the Barriers and Facilitators to Practice

Natalie Weiser , Melanie Dissanayake , Cecilia Santiago , Fiona Harrington, Nichelle Benny Gerard , Sarah Dimmock, Sonya Canzian , and Jane Topolovec-Vranic 

St. Michael's Hospital, Unity Health Toronto, 30 Bond St, Toronto M5B 1W8, ON, Canada

Correspondence should be addressed to Natalie Weiser; natalie.weiser@unityhealth.to

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Background. Registered Practical Nurses (RPNs) are considered a critical component of high functioning nursing and interprofessional care teams. Therefore, it is important to ensure that RPNs feel valued within their roles within acute care settings. High acute care demands in tandem with unsupported workplace environments can lead to increased levels of job dissatisfaction, burnout, and ultimately impact retention. Identifying and examining the barriers and facilitators that enable RPNs to be optimally equipped within acute care are critical towards ensuring success in their role. In this study, we explore the experiences of RPNs and perspectives of nurse leaders on RPN integration into an acute care setting. **Methods.** A mixed method study among RPNs ($n = 10$) and nurse leaders ($n = 10$) was conducted. This included administration of the Assessment for Collaborative Environments (ACE-15) tool to measure interprofessional integration, collaboration, and teamwork. Semi-structured interviews were also held with all participants to explore both the lived experiences of RPNs in the acute care environment and the perspectives of nurse leaders who had supported the onboarding and integration of RPNs. **Results.** Our inductive content analysis identified 5 themes: preintegration process, nursing team dynamics, RPN role clarity, challenges to RPN integration, and benefits to RPN integration. ACE-15 data showed no significant differences in the level of teamness and internal disagreement between RPNs and nurse leaders ($t(17) = 0.37$ and $p = 4.60$). RPNs reporting a higher level of teamness described a more positive integration experience than those who reported a lower level of teamness. **Conclusion.** The integration of a new role to existing teams brings both benefits and challenges which are experienced uniquely by RPNs and nurse leaders. Nurse leaders can utilize findings of this study to better prepare their staff and units for the integration of new roles into their models of care.

1. Introduction

A shortage in nursing capacity within acute care settings continues to burden the Ontario healthcare system [1]. As a result, nurses are experiencing higher levels of burnout, while patients are experiencing compromised levels of quality patient care [2]. To alleviate burdens due to nursing staffing shortages, new nursing care delivery models are being implemented [3, 4]. Such models include the reintroduction of Registered Practical Nurses (RPNs) into acute care [4].

In Ontario, Canada, nursing is one profession with multiple categories which include Registered Practical Nurse (RPN) and

Registered Nurse (RN). The main distinction between RNs and RPNs is foundational education. While RNs and RPNs acquire similar nursing knowledge, RNs study for a longer period of time, allowing for a greater depth and breadth of foundational knowledge [5]. In Ontario, a two-year diploma is required for RPNs and the nursing curriculum consists of courses such as basic human anatomy, practical nursing theory, and practical skill labs. RNs usually complete a four-year post-secondary university nursing program. Although there are significant areas of overlap for the two categories of nurses, differences in responsibility can be identified in terms of the depth, breadth, and scope of involvement with patient care [6]. RPNs are employed

in various settings including long-term care, hospitals, and community settings.

The additional educational requirements over the years have enabled RPNs to increase skills in clinical training, thereby expanding overall scopes of practice [7]. Furthermore, the literature has identified that RPNs are considered a critical component of high functioning nursing and interprofessional care teams [3, 8]. Therefore, it is important to ensure that RPNs feel valued within their roles within acute care settings.

High acute care demands in tandem with unsupported workplace environments can lead to increased levels of job dissatisfaction and burnout, and this ultimately impacts retention [9]. Identifying and examining contributing factors that enable RPNs to be optimally equipped within acute care are critical towards ensuring success in this role.

Over time, hospitals try to respond to changing workforce demand environments by adjusting their models of care. Our acute care centre is one such example. In the 1990s, our organization was an RN and RPN staffed hospital. The RPN role was more task-based at this time and RPNs worked under the supervision of an RN. During this time, the organization phased out the RPN role in preference of an exclusively RN staff. In response to changing demands including staff shortages, the RPN position has been reintroduced. While the RPN role has been reintroduced, it is important to be mindful that the RPN role has evolved over the past 30 years, with much more autonomy in practice. Furthermore, role evolution has resulted in overlapping scopes of practice with the RN role. Therefore, it is essential to understand the challenges and opportunities presented with the integration of the RPN role into the acute care setting.

Our study explores the experiences of the RPNs as they were reintegrated into our acute care setting. In particular, we evaluated how RPNs adjusted to work within an acute care setting that was previously all RN staffed through exploring the barriers and facilitators to practice. We also explored the perspectives of Nurse Leaders (NLs) including Clinical Leader Managers (CLMs), Clinical Educator-Nursing (CE-Ns), and Charge Nurses (CNs) in order to identify current and potential strategies which would best support the transition of RPNs to the acute care environment. Moreover, our study aimed to identify what strategies increased confidence and readiness to care for various patient assignments across differing units. Findings from the perspectives of RPNs and NLs were synthesized in order to present a fulsome representation of the RPN integration experience.

2. Methods

2.1. Setting. This study took place at an academic health science centre in Toronto, Canada. Our organization is a 450 bed centre which provides primary, tertiary, and quaternary care services. The clinical workforce is comprised of approximately 1914 nurses (1760 RNs and 154 RPNs) and 950 other health discipline clinicians.

2.2. Study Design. The study employed a mixed method approach utilizing both quantitative and qualitative methodologies. Quantitative data were collected using the

Assessment for Collaborative Environments (ACE-15) tool as well as a demographic survey to describe participants' work history. The demographic survey included clinical role, length of time on the unit, employment status, and the timing of typical shifts worked (i.e., weekday and weekend).

The ACE-15 is a 15-item measure with each item scored on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Example items include "Team members appreciate each other's roles and expertise" and "All voices on the team are heard and valued" [10]. The total item scale runs from a reported low level of integration of 15 to a high level of integration of 60. The higher the score, the higher the perception of interprofessional integration, collaboration, and teamwork. An inductive qualitative approach using semi-structured interviews was utilized to explore RPN and NL perspectives on the integration of the RPN role at our organization. In particular, interpretative phenomenological analysis (IPA) was the framework used to analyze qualitative data. IPA employs a phenomenological, hermeneutic, and idiographic approach together within one methodology, thereby being the most suitable to approach the phenomenon of interest [11].

2.3. Participants. RPNs were eligible to participate in this study if at the time of the study they were employed as an RPN at our organization and had 3 months or more experience as an RPN at the study site. NLs were eligible to take part in the study if at the time of the study they were employed at the organization and responsible for the onboarding and nursing orientation of RPNs.

2.4. Procedures. Ethical approval of this study was received from the Research Ethics Board of the hospital. Eligible participants were recruited through an emailed study invitation letter from CLMs and CE-Ns who have RPNs on their units. The study was also advertised through the hospital's broader communication channels and biweekly newsletters as well as existing mailing lists. Potential participants were provided with the study team's contact information and were instructed to contact the study coordinator for additional information. The study coordinator reviewed the study with interested participants, obtained consent, and sent participants an online survey link which had both a demographic survey and the ACE-15 measure. Following completion of the survey and ACE-15, the research coordinator scheduled an in-depth interview with participants.

2.5. Interviews. All participants took part in semi-structured individual interviews which ran between 30 and 60 minutes. Interviews took place using Zoom, and audio recordings were extracted for transcription. At the start of all interviews, participants provided verbal consent to ensure willingness to continue taking part in the study. Interviews were scheduled at a time that was convenient to participants. A study team member (N.W.) with expertise in qualitative interviewing completed interviews with all participants.

Two separate semi-structured interview guides (RPN and NL versions) were developed (Appendix A). The RPN interview focused on onboarding and orientation to the

hospital and integration to particular units, preparedness for the RPN role, supports (people and resources) in daily work activities, and challenges in the RPN role. The NL participants were asked about the onboarding and orientation of RPNs, the impact of RPN introduction on teamwork dynamics, and the benefits and barriers to RPN integration. As the interviews were semi-structured, participants had the flexibility to discuss additional topics and experiences which they deemed significant to the study topic. Data collection ended when the research team collectively agreed that thematic saturation was reached.

2.6. Data Analysis. Descriptive statistical analysis was performed. Proportions were generated for categorical data. Means, standard deviations, medians, and range were generated for each item in the ACE-15 measure from all respondents. Means, standard deviations, medians, and the range were summed to create an overall score. A two-tailed unpaired *t*-test was used to determine if there was a significant difference in the overall score of teamness between RPNs and NLs.

All interviews were audio recorded using Zoom and transcribed verbatim. Two members (N.W. and M.D.) of the study team individually completed an inductive content analysis beginning with a line by line review of all the transcripts in order to develop a comprehensive understanding of the data and ensure the subsequent coding trees were created with fidelity to the data (Appendix B). RPN and NL interviews were treated as separate datasets. N.W. and M.D. together generated a set of preliminary codes through open coding [12]. To develop reliability and trustworthiness, the transcripts were coded individually by N.W. and M.D. and emerging codes were compared and reviewed until consensus was achieved. Following this, the initial coding tree was revised and previously coded transcripts were recoded as needed to incorporate newer codes. Finalized codes were discussed with all research team members in order to integrate RPN and NL themes in the final analysis.

3. Results and Discussion

3.1. Participant Demographics/Characteristics of Study Participants. 16 RPNs responded with interest to either a study invitation letter or hospital wide communications advertising the study. 4 did not reply to a response e-mail, outlining study participation requirements, 2 did not complete the interview due to scheduling difficulties, and 10 completed the interview. 10 NLs responded to the study invitation, and 10 completed interviews. In both groups, 70% of the participants ($N=20$, $\chi^2(1)=0.95$, and $p>0.05$) have been working on the unit for under a year. 65% of the participants ($N=20$, $\chi^2(1)=1.98$, and $p>0.05$) have been in the nursing profession for more than 5 years. Majority of the participants (80%, $N=16$, $\chi^2(1)=1.25$, and $p>0.05$) worked full time compared to part time. Majority of the RPNs (90%, $N=9$) worked rotating shifts, whereas majority of the NLs (80%, $N=8$) worked day shifts. A chi-square test of

independence showed that there was a significant relationship between day and rotating shifts ($\chi^2(1)=9.90$ and $p<0.05$).

3.2. ACE-15. The ACE-15 tool is an assessment of the quality of interprofessional teamwork in clinical sites. This measure is a 15-item, self-report survey appropriate for a broad array of health professionals working in a variety of clinical sites. Scores from the NLs' responses ranged from 37 to 60 with a mean of 48.6 and a standard deviation of 8.6, whereas the scores from the RPN responses ranged from 31 to 60 with a mean of 46.9 and a standard deviation of 11.1. A higher mean score and a lower standard deviation indicate more teamness and less internal disagreement. All of the RPNs and 9 of the NLs completed the ACE-15 (95% response rate). There was no significant difference in the level of teamness when comparing the NLs with the RPNs ($t(17)=0.37$ and $p=4.60$).

Figure 1 shows these results pictorially.

3.3. Qualitative Themes. Our inductive content analysis identified 5 themes. 4 themes ran across the two participant groups including preintegration process, nursing team dynamics, RPN role clarity, and challenges to RPN integration. One theme unique to the NLs was benefits to RPN integration.

3.3.1. Preintegration Process. RPNs and NLs both described the process of preparing individual teams and/or units for the integration of RPNs. The extent to which established teams were receptive to the introduction of RPNs onto their team was shaped by the education and preparation from NLs as well as the extent to which RNs had prior experience working with RPNs.

Both groups explained that there were RN concerns around workload, patient safety, job security, and general uncertainty about the new team model. Participants also discussed how pre-existing beliefs and assumptions about RPNs needed to be addressed and the addition of RPNs was framed as an opportunity to enhance the strengths of the existing team.

I think it was fortunate for me having worked with RPNs in the past, like helping the roll out of RPNs on the unit it came in handy for sure. Because I think like part of the stressful part about introducing RPNs is there are a lot of people who've never worked with RPNs before and they didn't know, you know, what it would look like? What does that mean to me and my workload, or to the patients and all that. So, having that experience, made it really helpful. (NL 019)

A lot of them [RNs] were very hesitant for us to be integrated even into the area that we were integrated into originally, because they had no knowledge about what our scope was, and instead of just educating themselves on what our scope is, made presumptions about what we could and couldn't do. (RPN 004)

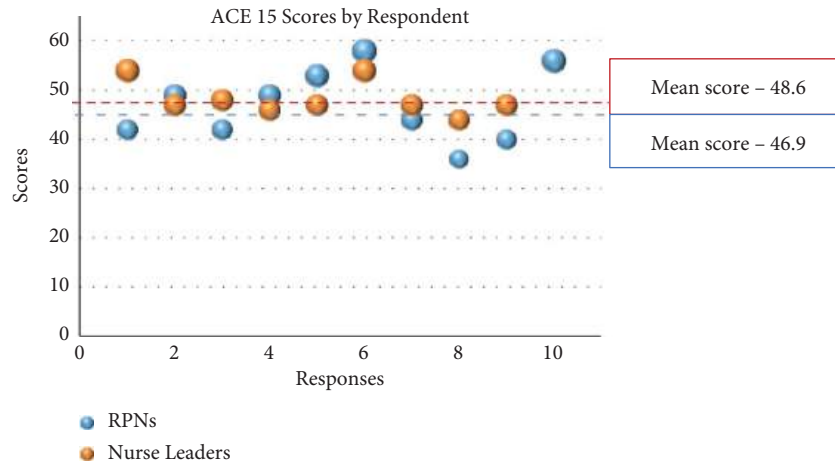


FIGURE 1: ACE-15 scores.

Another NL suggests that nurses who have worked with RPNs in the past should speak about their collaboration experiences with their current team. This would be helpful to alleviate or address some of the concerns of existing team members and provide a sense of what the new team model will look like in terms of working with the patient population on the particular unit and how the new roles will inform one another.

I think first talking to the RN team, if they're not used to working with RPNs, and identifying any challenges that they foresee and then addressing those challenges before integrating the RPNs would help a lot, especially with the culture, if it's going to be a huge culture shift. You don't want to integrate RPNs when RNs are not being receptive. So addressing those barriers before integrating the RPNs into the unit, I think would be very beneficial. (NL 007)

Many participants addressed the culture of the unit as a salient aspect of the preintegration landscape. One of the NLs describes her unit as being fairly new and therefore lacking an established culture or history of a particular nursing model. As such, with the onboarding of RPNs, there was not a significant change to nursing practice as the unit was still building their processes and procedures.

One NL explained the need to educate the nursing team and build relationships when there is a change and a new blending of team members:

...you can't introduce a new role without someone else feeling like, who is this person? why are they here? what does this mean for me? And honestly, like, I had one nurse who actually said that, like, what does this mean, for me? So having people to talk to about that, and their biggest fears, their, you know, fantasies of what might happen, I think is critical to success when you're changing skill mix on a team. (NL 010)

NLs also noted that prior to the RPN integration, there was corporate communication, program level discussion, and unit specific education about the value of the RPN role, the RPN scope of practice, and how RPNs would fit into the existing team.

3.3.2. Nursing Team Dynamics. Nursing team dynamics emerged as a strong theme in the interviews as both RPNs and NL described the nature of the relationships between RPNs and RNs once RPNs were brought into the hospital. Some CENs and CLMs discussed tension early on as RPNs joined their teams. The RPNs also explained that there was initially some resistance when they joined their teams. As one RPN reflects,

There did seem to feel like a little bit of a divide, I don't know if that was just like me just overthinking things. But after a couple of weeks, in really getting to know the other staff, I could kind of tell that they didn't really care as long as the patients were kept safe. (RPN 009)

Another RPN describes that when they first came to the hospital, there were concerns about whether they could be trusted as capable members of the nursing team. An important component of integrating onto the team was patience as trust between RPNs and RNs was established.

I think when they when we [RPNs] first came in, they [RN]s felt like they couldn't trust us. I kept telling myself we are new to each other and it takes years. Just be patient. (RPN 003)

A NL describes the shift in RN feelings towards RPNs postintegration:

I believe that especially a couple of my naysayers, they've come around. I think it's because we had to prove it, they

had to live it, they had to see that, in fact, this [RPN integration] wasn't negatively impacting their assignments, and that these people [RPNs] were great team players, and that care being provided for patients remains the same. (NL 015)

Peer support between RPNs on a team was highlighted as a strategy to mitigate the tensions felt during the early days of integration. As one RPN explains, "a lot of the times, RPNs have to support RPNs as much as we can" (RPN 004).

Participants explained that over time there was a positive shift in the dynamics of the teams. The teams were described as being more cohesive and supportive. Many explained that they felt they were a nursing team as opposed to "RPN vs. RN." One RPN notes that she felt very supported by her team members and this gave her confidence to ask questions as she was learning the new role.

I was always supported when it came to my shadowing shifts. I always had somebody with me and anytime I had any type of questions, I would just full on ask them. I never felt afraid to ask any type of questions when it came to care. (RPN 008)

3.3.3. RPN Role Clarity. Participants explained that the role of the RPN as a unique designation with separate responsibilities from RNs was not always clear. One RPN explains, "RPN and RN care is not black and white, it depends on the care, patient, and staff who are on" (RPN 005). Another RPN states, "they limit what we can take on as RPNs. And sometimes it feels like there's a very blurred line" (RPN 009). The lack of role clarity was especially prevalent in units where there is less acuity in the patient population. As described in the interviews, RPNs are meant to take on patients who are more stable and predictable, while RNs accept patients who are less stable and less predictable. As such, more patient acuity in a unit suggests more differentiation between RPN and RN roles.

Generally, I do know that what is supposed to happen is that the patients who are more acutely ill, and whose status changes quicker, those patients are technically supposed to be given to the RNs and the more stable patients are supposed to be given to the RPNs. I don't believe in my personal opinion that is very true on this particular unit. I think that on this particular unit that all of the nurses are given equal assignments. (RPN 008)

So usually, they would like to assign patients with predictable outcomes to RPNs, anything that they're concerned where a patient may change, and it will require a lot more critical thinking, analysis work from an RPN, that's when you would choose to give the patient to an RN. But at the same time, it doesn't negate what an RPN can do, they could still have a more critical patient, but just making sure that there is an RN available for guidance in case of any kind of concerns. And then if it was just too beyond their scope, then you transition the care to the RN. So, I think on our unit, in general, since our patients are typically pretty

predictable outcomes, there isn't much difference in how we are assigning our patients for an RN versus an RPN. (NL 012)

Some NLS also described that because the tasks of RPNs and RNs are often very similar, there are scenarios in which healthcare professionals or patients and families will not know whether a nurse is an RPN or an RN.

You know, there's many things that the RPN can now do that they once couldn't do, but to actually see the tangible difference in regards to tasks it's very hard actually, to tell the difference between an RN and RPN. And if you ask a lot of our physicians, I don't think that they actually know the difference between the two. They see all of our nurses as quote un quote, nurses with different levels of experience. (NL 001)

One of the NLS predicts that "going forward for the future, I really see that the RPN and RN role is blending, like, I don't see the clarity between them" (NL 012). Another NL however cautions that blurring the line between various healthcare professional roles is not desirable and can compromise patient safety:

I think it's absolutely critical that there are clear identities and roles. You know, you have a special designation with a college of nurses, it should be clear to everyone, whether you're a nurse, an RPN, a social worker, an OT. Patients should be able to ask, family members should be able to ask, and I think just saying we're all just nurses, that just kind of minimizes it and from a safety perspective it's terrible. I don't like that idea that we're all one at all. (NL 010)

3.3.4. Challenges to RPN Integration. The challenges to the RPN integration were largely related to the setting being an RN only environment and a lack of understanding about what the RPN role would contribute to the established team composition.

And so it came with a lot of either positive or negative preconceived notions about what an RPN could bring to the table. I found that was probably one of the toughest challenges that we encountered was getting past people's, like myths, almost it was like it was things that people had heard, it's not that it was rooted in any sort of evidence. (NL 001)

One RPN explains how acceptance onto her unit was made difficult by team members who were not as open to the change in the nursing care delivery model:

If you were to ask me to give advice to someone that is onboarding, I would say, don't really take everything personally. Because it really depends on the personality of who you're dealing with. And that just could be who they are. And kind of just, they're adjusting to you joining their unit as much as you are adjusting to being

on the unit. Because it's like, that's their home. And that's what they're comfortable with. And some people don't like change. (RPN 009)

NLs also described structural challenges such as compensation discrepancies between nursing roles. Because RPN and RN tasks overlap in many respects, some NLs note that there is RPN dissatisfaction about pay inconsistency. Moreover, the lack of distinct nursing responsibilities between RPNs and RNs on some units raises questions about the distinct nature of the RN position:

The challenge I'm getting faced with now is, as I am rolling it out, I'm hearing two different things; what is the RN identity? What is our unique role in this hospital? And I guess, yeah, the use of the unique role of the RN has come up and then from an RPN point of view, I've heard such comments as why are we getting paid so much less and doing the exact same work? (NL 014)

Another NL elaborates that there is “tension amongst the team more so for the RPNs. Because the RPNs feel like, why am I getting paid like half your wage, when I'm doing literally the exact same job as you” (NL 017).

RPNs discussed the emotional impact of their integration as they highlighted feelings of being undervalued on their teams. As some RPNs were introduced to the organization during the early phases of the COVID-19 pandemic, some were first brought on as screeners in the emergency department. This was described as a source of frustration because RPNs felt they were not given an opportunity to utilize their nursing skill set.

3.3.5. Benefits of RPN Integration. NLs explained the benefits of integrating RPNs to the acute care setting from a staffing perspective. Some noted that RPNs delivered excellent patient care, they work as collaborative members of the team, and they are valued for their feedback about practice on the units. Moreover, RPNs were described as being experts in their particular fields who can support the nursing team as some RPNs came to the acute setting with decades of experience as internationally trained nurses or with experience from other settings such as complex care or long-term care.

Many interviews described the context of the COVID-19 pandemic which compounded prevailing staffing challenges. The addition of RPNs was beneficial as they were able to provide more hours of nursing services for patients.

They [RPNs] kind of provided us some flexibility in our staffing model. I think the pandemic too has been an interesting challenge. I guess in regards to that, like, I think the amount of registered nurses' vacancies that we've had on our particular unit, in the past, if you couldn't get a registered nurse that position would sit vacant. And so I guess too maybe it depends on the CLM but we were really able to increase our staffing capacity by hiring RPNs. (NL 001)

Whenever I brought in an RPN, there was a relief, yes, another full time [nurse] onboarded. I felt like people really welcomed, they wanted the expansion of the team. (NL 006)

The improvement of quality of patient care was also discussed as a benefit to RPN integration. By opening the workforce to RPNs, there is a wider pool of applicants from which nurses are hired. A NL states, “I think it's improved the quality of care in that we are getting the correct person and not someone based on a limited qualification. So we're getting more diversity in nursing and nursing knowledge” (NL 014).

3.4. Relationship between ACE-15 and Qualitative Themes. We aimed to assess whether self-reported levels of teamness on the unit were reflected in the respondent interviews. Accordingly, we re-explored the transcripts from RPN participants with the highest and lowest ACE-15 scores. The RPNs with the highest ACE-15 scores explained in their interviews that they felt very supported by their teams:

At first everyone was kind of touchy of like, what we can do and what can't we do? And now like we're more open, and we're more talkative with management and the unit leader and educator. (RPN 002)

I felt so supported my very first solo day, I think all of my buddy nurses, like, two nurses above me, when it came to the rooms and then two nurses behind me and the charge nurse, everybody knew that I was going solo and they kept checking in all the time. They're like, how are you doing? Do you need any help with this? I felt very, very supported. (RPN 008)

RPNs with the lowest ACE-15 scores noted feeling “underutilized” and distrusted by RNs on their teams:

Even to this day you can sometimes see where the RNs are hesitant to have RPNs, or just like that trust factor is very, like not, it's not automatic. Whereas a new grad student that just got out of an RN program, they have more trust than me, where I've been working as RPN for five years and on this floor for a year and a half now, but a new grad that just started last month is going to have more trust. (RPN 004)

Overall in this subanalysis, RPNs reporting a higher level of teamness described a more positive integration experience than those who reported a lower level of teamness.

4. Discussion

The integration of a new role to existing teams brings both benefits and challenges which are experienced uniquely by RPNs and NLs. Specifically, our in-depth study identified the following themes common to both groups: preintegration process, nursing team dynamics, RPN role clarity, and challenges to RPN integration. One theme unique to the NLs was benefits to RPN integration. Moreover, our secondary

analysis suggested that RPNs working on units with high levels of teamness generally had a more positive experience than those with low levels of teamness.

There are a variety of ways to enhance teamness and address gaps or challenges in team dynamics. Education or learning and development portfolios at healthcare organizations could develop and implement teamwork educational workshops and programs for fostering both inter- and intraprofessional collaboration [13]. Other examples include setting up charters for how teams will work together, protecting time in meetings for discussion about roles and scopes of practice, shadowing different professions to enhance role clarity and individual courses through learning centres. Teams might also employ validated tools such as the ACE-15 to assess levels of teamness on their units and address gaps either prior to or as part of the integration of new roles. Increasing teamwork among patient care teams is valuable as it can positively influence both job satisfaction and patient care [14].

Consensus among teams about roles and scopes of practice are also essential to a successful implementation of new nursing roles. Teams must have role clarity and understand how the various nursing positions fit into the wider team in order to have collaborative relationships among one another [15]. However, this is an ongoing process as factors such as evolving patient needs, interprofessional team models, and other healthcare system changes require constant monitoring and assessment of role clarity and scope of practice for all professions, including RPNs [16].

This study had both strengths and limitations. Our study examined two sets of nursing perspectives, utilized a mixed method approach, and was conducted at an organization that is early in its RPN integration process. Because RPNs are very new to the site, the findings are near real time. Finally, we included an RPN in the data coding process which allowed for a rich and nuanced analysis which was grounded in the RPN's clinical experiences. A limitation of the study is that NL participants may have been more supportive of RPNs than those who chose not to participate in the study. Conversely, RPNs who chose to take part in the study may have been those with more negative experiences and a self-selection bias may have been at play. A second limitation is that we did not include Registered Nurses (RNs) as participants other than those who are both RNs and NLs. The RN perspective would be valuable to an understanding of the nursing dynamics theme.

A strong theme that emerged from NLs was the necessity of preintegration activities that would help a unit succeed in the introduction of the RPN role. In particular, dedicating time to educating existing team members about the scope of RPNs' practice was explained as vital to the success of the integration process. In addition, a focus on the value RPNs bring to the team is important to highlight especially in circumstances in which team members are new to working with RPNs. Other NLs discussed having conversations with teams about RPN integration and the shifting dynamics of a new skill mix on the team. In this way, current team members would be educated and prepared for collaborating with RPNs.

The theme of role clarity suggests the value of developing unit-specific guidelines for tasks assigned to RNs and RPNs. Role clarity would allow for a common understanding of one another's roles for the entire interprofessional team. A shift assignment toolkit, for example, can enhance role clarity and collaboration with respect to patient assignments. A standardized resource on shift assignment can also help healthcare organizations diminish role ambiguity among newly introduced RPNs in acute care settings.

5. Conclusion

The integration of a new role to existing teams brings both benefits and challenges which are experienced uniquely by RPNs and NLs. NLs can utilize findings of this study to better prepare their staff and units for the integration of RPNs but also any shifts or changes in their models of care. Our findings could be used to improve RPNs' integration in acute care, optimize the professional nursing environment to allow RPNs to practice to their full scope, and enhance the quality of patient care. Future studies can explore other interprofessional team members' perspectives on RPN integration to provide a more fulsome picture of the integration process. For example, the RN perspective would be valuable in further exploring the nursing dynamics theme. Additional work could also evaluate strategies to help address some of the themes identified above by increasing levels of teamness to boost team dynamics. Finally, how these strategies affect long-term outcomes such as burnout and nursing retention remains to be explored.

Data Availability

The data that support the findings of this study are available upon reasonable request from the authors and with permission from the ethical bodies.

Disclosure

Preliminary results of this study were presented as an e-poster at the 29th International Council of Nurses (ICN) Congress in July 2023 in Montreal, Canada, under the title, "Barriers and Facilitators to the Practice of the Registered Practical Nurse (RPN) Role in an Academic Acute Care Hospital."

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Appendix A shows two semi-structured interview guides (one for Registered Practical Nurses and one for Nurse

Leaders). Appendix B shows the codebooks developed and utilized during data analysis for both Registered Practical Nurses and Nurse Leaders. (*Supplementary Materials*)

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Research Article

The Relationship between Negative Leadership Behaviours and Silence among Nurses

Zhi-Ying Li ¹, Yu-Pei Yang ², Qian Wang ¹, Tao-Hsin Tung ³ and Hai-Xiao Chen ^{1,4}

¹Taizhou Hospital of Zhejiang Province Affiliated to Wenzhou Medical University, Linhai 317000, Zhejiang, China

²Department of Hematology, Taizhou Hospital of Zhejiang Province Affiliated to Wenzhou Medical University, Linhai 317000, Zhejiang, China

³Evidence-Based Medicine Center, Taizhou Hospital of Zhejiang Province Affiliated to Wenzhou Medical University, Linhai 317000, Zhejiang, China

⁴Taizhou Hospital of Zhejiang Province, Zhejiang University, Linhai, Zhejiang, China

Correspondence should be addressed to Tao-Hsin Tung; dongdx@enzemed.com and Hai-Xiao Chen; chenhx@enzemed.com

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Background: Negative leadership behaviour is very common and pervasive in nursing and healthcare, often leading to adverse effects such as nurses' silence, decreased job performance, and turnover. However, there is a lack of systematic reviews that summarize negative leadership types and nurses silencing behaviours. **Aim:** This systematic review examined the relationship between negative leadership behaviour and nurses' silence. **Evaluation:** We searched PubMed, Embase, the Cochrane Library, Web of Science, CNKI, VIP, and Wanfang databases from their inception until 30 April 2024 for articles examining the relationship between negative leadership and silent behaviour among nurses. The studies were reviewed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The risk of bias in the included studies was assessed using the Newcastle–Ottawa Scale. **Key Issues:** After full-text analysis, six papers were included in this systematic review. Four of the studies were conducted with nurses, and the remaining two were conducted with all medical staff including nurses. While most studies have shown that negative leadership causes nurses to become increasingly silent, others have shown that appropriate negative leadership behaviour instead reduces nurses' silence. **Conclusions:** Negative leadership behaviour can affect the silent behaviour of nurses. **Implications for Nursing Management:** Hospitals need to take the initiative to build a harmonious and safe working environment, correctly recognize and identify negative management behaviour, take appropriate and effective measures to enhance the positive leadership of nurse managers, and make an effort to prevent nursing staff's exposure to the negative management of direct leadership and mental health threats, which is a key point that hospital administrators and health policymakers tend to overlook. This is also effective for enhancing the leadership of hospital administrators.

1. Introduction

Leadership behaviour affects employees' work behaviour, organisational goals, and efficiency and has been a continual interest in management research. Most studies have focused on positive leadership behaviours and their positive effects, whereas little attention has been paid to the effects of negative leadership behaviours on employees and organisations [1]. Negative leadership behaviour refers to behaviour that leads to potential physical, psychological,

emotional, or economic damage to subordinates due to the abuse of power in the process of managing employees [1]. Abusive supervision, defined as “verbal and nonverbal behaviours perceived by subordinates as hostile by their superiors, excluding physical contact behaviours,” is the most common manifestation of negative leadership behaviour [2]. In addition, authoritative leadership and toxic leadership are also typically negative leadership behaviours. Authoritative leaders are those who emphasise that their power is absolute and unchallengeable [3]. Hoffman and Sergio described

disregarding employees' wellbeing and participating in actions and activities that demean, belittle, and discourage employees as characteristic traits of toxic leadership [4]. As nurses are the largest professional group in healthcare, currently, research on negative leadership behaviours such as abusive supervision within the healthcare sector has predominantly focussed on nurses [5–8].

Recent medical studies have reported various negative consequences of negative leadership behaviours, such as nurse's turnover and silence [5, 9]. Silence is defined as employees intentionally withholding vital information, concerns, suggestions, questions, and opinions about issues related to the job and the organisation [10]. Silence is prevalent in hospitals and has a negative impact on the human resources of healthcare organisations [11]. Previous studies have demonstrated that negative leadership is a significant factor in nurses' silence [10, 12–14]. Leaders' concepts used in the management process (e.g., they think they know more than their subordinates and deny the authenticity of information) can indirectly cause subordinates' silent behaviour [15]. Organizationally, nurses' silence poses a significant threat due to its pervasive detrimental effects, such as the loss of critical information and creative ideas, across all levels of the organization when compared to other passive responses to negative leadership behaviours [16].

Although previous study indicated that nurses' silence not only could have numerous negative impacts on both individuals and organisations but also could impede communication among nurses, obscure patient safety hazards, and hinder the prevention of adverse events individually [9, 16, 17]. There is a lack of systematic reviews on the relationship between negative leadership behaviours and silent behaviours of nurses. In addition, academic studies suggested that negative managerial behaviours of nursing leaders may lead to silencing of nurses, but the relationship is still unclear. This systematic review is conducted to clarify the relationship between negative leadership behaviours and silence among nurses.

2. Methods

2.1. Design. This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, and its protocol was registered in PROSPERO with the number CRD42023422847.

2.2. Search Methods. A comprehensive search was undertaken by two independent researchers (LZY and WQ) across the following databases: PubMed, Embase, the Cochrane Library, Web of Science, CNKI, Wanfang, and VIP databases, from inception until 30 April 2024, to identify studies that examined the relationship between negative leadership behaviours and nurses' silence. The search strategy involved a combination of relevant MeSH terms and other key terms such as “silence,” “speak out,” “speaking up,” “voice,” “work-related suggestions,” “abusive supervision,” “autocratic leadership,” “negative leadership,”

“toxic leadership,” “destructive leadership,” “passive leadership,” and “adverse leadership”. We conducted a manual search of the reference sections of the included publications to identify any articles that may have been overlooked during the initial search. The complete search strategy is outlined in Table 1.

2.3. Eligibility Criteria and Study Selection. We included studies with nurses or medical staff (including nurses). Studies assessing negative leadership and silence were included. Abusive supervision and authoritative or toxic leadership were considered negative leadership. The included studies were not limited to publications in languages. Qualitative reports, expert opinions, reviews (literature and systems), meta-analyses, and inaccessible articles are excluded.

First, two researchers (LZY and YYP) identified and removed duplicate records and then sifted through titles and abstracts to remove studies that were not relevant to the research question. Finally, the full-text articles were retrieved and reviewed for inclusion and exclusion, and any discrepancies in the above process were adjudicated by a third researcher (TTH).

2.4. Study Selection and Data Extraction. To prevent bias in the data extracted by individuals, two researchers (LZY and YYP) identified and removed duplicate records and then sifted through titles and abstracts to remove studies that were not relevant to the research question. Finally, the full-text articles were retrieved and reviewed for inclusion and exclusion. Any discrepancies in the abovementioned process were adjudicated by a third researcher (TTH) until a consensus was reached.

When appropriate studies were identified, a structured table was designed to obtain the following data from the included studies: authors, publication year, country, study design, hospital setting, sample size, participant characteristics, type of negative leadership, negative leadership measurement tool, silence measurement tool, and results of the correlation between negative leadership and silence among nursing staff.

2.5. Quality Appraisal. The selected studies were independently assessed for quality by two researchers (LZY and WQ) of this study. The Newcastle–Ottawa Scale (NOS) was utilised to evaluate the quality of the studies, and any discrepancies were reconciled through consultation with a third researcher (TTH) who received relevant training. The NOS assesses the quality of studies based on the following three domains: selection of study groups, comparability, and assessment of outcomes [18]. Studies that scored ≥ 7 stars were of high quality [19].

2.6. Synthesis of Results. The following three extensive outcomes were considered: (1) negative leadership behaviours, (2) silence, and (3) the relationship between negative leadership behaviours and silence among nurses. The

TABLE 1: Search strategy.

Source	Search strategies
PubMed (N = 597)	<p>#1 silence [Title/Abstract] OR speaking up [Title/Abstract] OR speak up [Title/Abstract] OR speak out [Title/Abstract] OR speak [Title/Abstract] OR voice [Title/Abstract] OR safety voice [Title/Abstract] OR safety concern [Title/Abstract] OR worry [Title/Abstract] OR work-related suggestions [Title/Abstract] OR work-related opinions [Title/Abstract] <i>n</i> = 86297</p> <p>#2 abusive supervision OR abusive manager OR passive leadership OR negative leadership OR destructive leadership OR toxic leadership OR dark side leadership OR exploitative leadership OR intrusive leadership OR despotic leadership OR autocratic leadership OR paternalistic leadership OR adverse leadership OR unethical leadership OR nonphysical abuse <i>n</i> = 83747</p> <p>#3 #1 AND #2 <i>n</i> = 597</p> <p>Search date: 2024/4/30</p>
Embase (N = 244)	<p>#1 silence OR speaking up OR speak up OR speak out OR speak OR voice OR safety voice OR safety concern OR worry OR work-related suggestions OR work-related opinions <i>n</i> = 188221</p> <p>#2 abusive supervision OR abusive manager OR passive leadership OR negative leadership OR destructive leadership OR toxic leadership OR dark side leadership OR exploitative leadership OR intrusive leadership OR despotic leadership OR autocratic leadership OR paternalistic leadership OR adverse leadership OR unethical leadership OR nonphysical abuse <i>n</i> = 8663</p> <p>#3 #1 AND #2 <i>n</i> = 244</p> <p>Search date: 2024/4/30</p>
Web of Science (I = 1097)	<p>#1 TS = (silence OR speaking up OR speak up OR speak out OR speak OR voice OR safety voice OR safety concern OR worry OR work-related suggestions OR work-related opinions) <i>n</i> = 726065</p> <p>#2 TS = (abusive supervision OR abusive manager OR passive leadership OR negative leadership OR destructive leadership OR toxic leadership OR dark side leadership OR exploitative leadership OR intrusive leadership OR despotic leadership OR autocratic leadership OR paternalistic leadership OR adverse leadership OR unethical leadership OR nonphysical abuse) <i>n</i> = 18403</p> <p>#3 #1 AND #2 <i>n</i> = 1097</p> <p>Search date: 2024/4/30</p>
The Cochrane Library (N = 188)	<p>#1 silence OR speaking up OR speak up OR speak out OR speak OR voice OR safety voice OR safety concern OR worry OR work-related suggestions OR work-related opinions <i>n</i> = 18328</p> <p>#2 abusive supervision OR abusive manager OR passive leadership OR negative leadership OR destructive leadership OR toxic leadership OR dark side leadership OR exploitative leadership OR intrusive leadership OR despotic leadership OR autocratic leadership OR paternalistic leadership OR adverse leadership OR unethical leadership OR nonphysical abuse <i>n</i> = 950</p> <p>#3 #1 AND #2 <i>n</i> = 188</p> <p>Search date: 2024/4/30</p>

TABLE 1: Continued.

Source	Search strategies
CNKI (N = 768)	#1 SU = (speaking up + speak up + speaking out + voice + silence + safety voice + safety concern + speak) n = 209986 #2 FT = (abusive supervision + abusive manager + passive leadership + negative leadership + destructive leadership + toxic leadership + dark side leadership + adverse leadership) n = 8042 #3 #1 AND #2 n = 768 Search date: 2024/4/30
Wanfang (N = 59)	#1 Title/Abstract:(speaking up or speak up or speak out or voice or silence or safety voice or safety concern or speak) n = 51306 #2 all Fields:(abusive supervision or abusive manager or passive leadership or negative leadership or destructive leadership or toxic leadership or dark side leadership or adverse leadership) n = 3562 #3 #1 AND #2 n = 59 Search date: 2024/4/30
VIP (N = 4124)	#1 T = (speaking up OR speak up OR speak out OR voice OR silence OR safety voice OR safety concern OR speak) n = 56964 #2 T = (abusive supervision OR abusive manager OR passive leadership OR negative leadership OR destructive leadership OR toxic leadership OR dark side leadership OR adverse leadership) n = 154813 #3 #1 AND #2 n = 4124 Search date: 2024/4/30

baseline and correlations for the outcome variables were evaluated. A meta-analysis could not be conducted due to the high heterogeneity of the included studies' designs and results reporting.

3. Results

3.1. Search Results and Quality Appraisal. A total of 7,077 studies were initially identified. After removing duplicate articles ($n = 1,629$), 5,448 articles remained for further evaluation regarding their potential inclusion in this systematic review. Of these, 5,168 articles were excluded after screening the titles and abstracts. A final total of 265 articles required full-text review. Following this rigorous process, only six studies were finally included in this systematic review (Figure 1). All six studies were assigned less than seven stars (Table 2).

3.2. Characteristics of the Included Studies. The characteristics of the selected studies are summarized in Table 3 [20]. All selected studies used cross-sectional study designs. Four of the included studies [9, 13, 14, 21] were from Asia and two [10, 12] were from Africa. Four of the studies [9, 11, 13, 14] were conducted with nurses and the remaining two [10, 21] were conducted with all medical staff including nurses.

3.3. Negative Leadership Behaviours. Table 4 shows that three studies [9, 10, 13] focus on abusive supervision; one [12] on toxic leadership and two [14, 21] on authoritative leadership. The mean scores for abusive supervision were from 1.5 to 2.5 [9, 10, 13]. The mean score of nurses' toxic leadership perception was 3.91 ± 0.51 . The mean score of nurses' authoritative leadership perception was 2.97 ± 1.06 [14]. In addition, one study using qualitative interview methods found that authoritative leadership was an important factor affecting the silent behaviour of medical staff [21].

3.4. Silence among Nurses. Three studies used identical scales, with mean scores ranging from 3 to 4, indicating that nurses' silence was at a moderate level [13, 14, 21]. In the three remaining studies, the nurses' silence scores were 4.90 ± 0.72 , 1.67 ± 0.63 , and 2.73 ± 0.77 , respectively [9, 10, 12].

3.5. Negative Leadership Behaviours and Silence among Nurses. The included articles showed a moderate positive correlation between negative leadership behaviours and nurse's silent behaviour in four out of six studies, with correlation coefficients of 0.40, 0.49, 0.35, and 0.64, respectively [9, 10, 13, 14]. Li et al. [13] and Zhang [14] also documented that negative leadership behaviour was not only

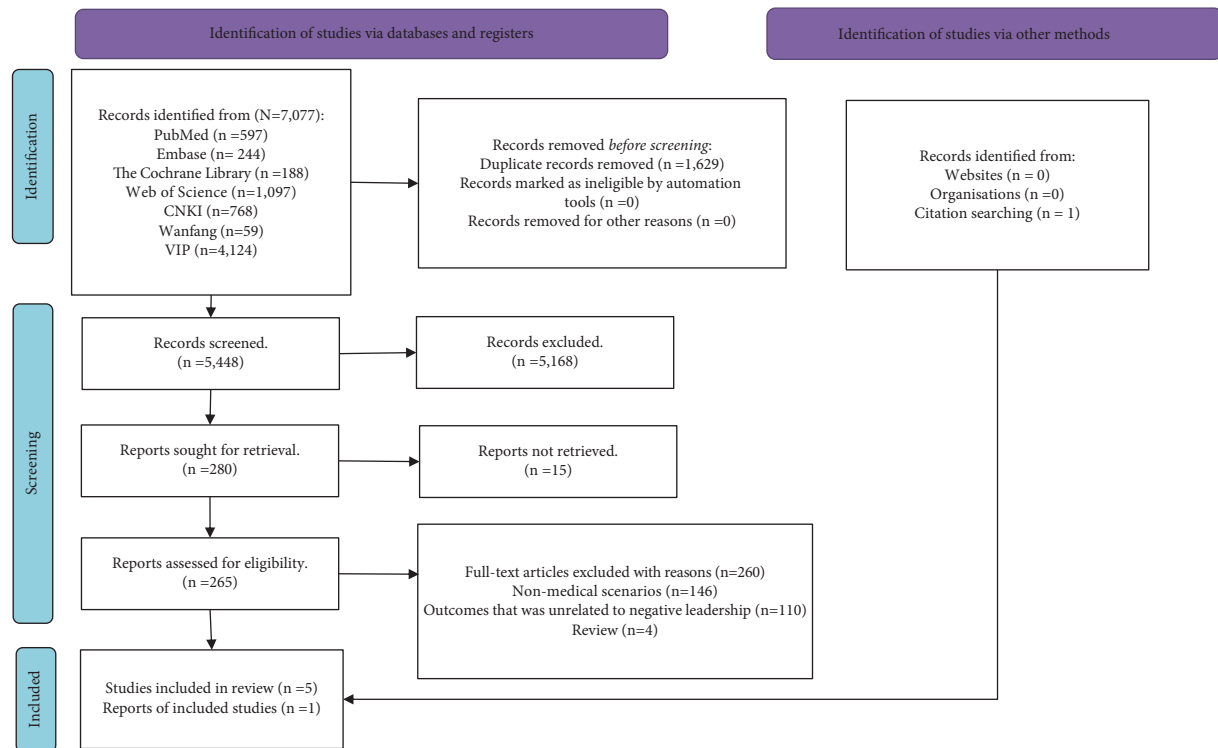


FIGURE 1: PRISMA flow diagram.

significantly and positively related to nurses' silent behaviour but also significantly and positively related to all three of its dimensions. Qualitative analysis concluded that negative leadership behaviours of hospital managers led to silent behaviours among medical staff [21]. All of the above-mentioned studies suggested that negative management behaviours exhibited by hospital leaders exacerbated the silent behaviour of nurses and retained relevant constructs about the organization or manager. However, not all studies have found a positive relationship between negative leadership behaviours and nurses' silence. Farghaly Abdelaliem et al. [12] found a significantly negative correlation between toxic leadership behaviours and nurses' silent behaviour, displaying negative correlation ($r = -0.77$).

Three of the selected articles found that there were other variables that played a role in the relationship between negative leadership behaviours and nurse's silence [9, 10, 14]. Li et al. [9] found that impression management motivation played a partially mediating role in negative leadership behaviours and nurse's silence. Osei et al. [10] showed that proactive personality positively moderated the effect of abusive supervision on medical staff silence. Zhang [14] showed that personality traits partially moderated the relationship between authoritative leadership and nurse's silence.

4. Discussion

4.1. Clinical Implications. To the best of our knowledge, this is the first systematic review on the relationship between negative leadership behaviours and nurses' silence. Many

studies on negative leadership behaviours and employee-silencing behaviours in companies or organizations outside of healthcare have drawn widespread recognition from academia and society, but few are based on healthcare scenarios. Among the six included studies, we found that most studies on negative leadership behaviour were conducted in Asia and Africa, and research was lacking on Western developed countries and regions. This may be related to the different cultural context, with Asian cultures being high power distance cultures, in which subordinates tend to accept and expect to maintain a subordinate relationship with their superiors [22]. A high power distance national culture may, therefore, disincentivize mutual respect and create conditions that are ideal for propagating unchallenged incivility throughout organizations [23, 24]. As for nurses' silence, Asian nurses were more silent, probably because in most Asian cultures, where hierarchies are more rigid and power differentials are greater, speaking up is more challenging than elsewhere and can be risky [25]. Furthermore, many nursing staff chose to remain silent to protect themselves when they perceive problems within their organizations [26].

Four studies [9, 10, 13, 14] showed a significant positive relationship between negative leadership behaviour and silent behaviour among nurses, which is consistent with most studies. Previous studies have showed that authoritative leadership is positively related to employee silence, and the stronger the authoritative leadership style, the more likely it is to lead to silent behaviour [27, 28]. Wang et al. [29] have established that employees' tendency to remain silent is a direct consequence of abusive supervision practices, and

TABLE 2: Quality assessment of included studies using the Newcastle–Ottawa Scale (NOS).

Author	Year	Is the case definition adequate (1 point)	Selection			Definition of controls (1 point)	Comparability of cases and controls on the basis of the design or analysis (2 point)	Exposure		Quality (9 point)
			Representativeness of the cases (1 point)	Selection of controls (1 point)	Ascertainment of exposure (1 point)			Same method of ascertainment for cases and controls (1 point)	Nonresponse rate (1 point)	
Li et al.	2024	1	1	0	0	1	1	1	1	6
Farghaly Abdelaliem et al.	2023	1	1	0	0	1	1	1	1	6
Osei et al.	2022	1	1	0	0	1	1	1	1	6
Pang	2022	1	1	0	0	0	0	1	1	4
Zhang	2021	1	1	0	0	1	1	1	1	6
Li et al.	2014	1	1	0	0	0	1	1	1	5

TABLE 3: Main characteristics of the included studies in the systematic review.

Nos.	Study	Study design	Hospital setting	Sample size	Sex	Age(years)	Education (%)	Professional title	Marital status	Work seniority (years)
1	Li et al., 2024, China	Cross-sectional	A hospital in Zhejiang, China	419	6 males and 413 females	21-24 (25.5%) 25-29 (23.9%) ≥30 (50.6%)	Bachelor and above (71.4%) Other (28.6%)	Nurses (31.7%) Nurse practitioners (38.9%) Nurse-in-charge or above (29.4%)	Married (56.3%) Unmarried (43.2%) Other (0.5%)	<5 (37.7%) 5-9 (21.7%) ≥10 (40.6%)
2	Farghaly Abdelallem et al., 2023, Egypt	Cross-sectional	A hospital in Alexandria, Egypt	750	163 males and 587 females	<35 (34.9%) ≥35 (65.1%)	Bachelor and above (95.7%) Other (4.3%)	NA	Married (52.3%) Unmarried (26.0%) other (21.7%)	<5 (43.5%) 5-10 (56.5%)
3	Osei et al., 2022, Ghana	Cross-sectional	Five hospitals in Ghana	300	138 males and 162 females	30 ± 0.77	First degree (41.6%) Other (58.4%)	NA	NA	5 ± 1.28
4	Pang, 2022, China	Cross-sectional	A hospital in Henan, China	267	114 males and 153 females	≤25 (10.5%) 26-35 (52.8%) >35 (36.7%)	Bachelor and above (87.6%) Other (12.4%)	Primary titles (50.6%) Intermediate titles (33.3%) Senior titles (16.1%)	Married (76.0%) Unmarried (23.6%) Other (0.4%)	≤5 (37.1%) 6-10 (21.3%) >10 (41.6%)
5	Zhang, 2021, China	Cross-sectional	Five hospitals in Henan, China	560	63 males and 497 females	<25 (25.2%) 25-30 (50.7%) >30 (24.1%)	Bachelor and above (54.5%) Other (45.5%)	Primary titles (82.3%) Intermediate titles (15.4%) Senior titles (2.3%)	Married (49.1%) Unmarried (49.5%) Other (1.4%)	≤5 (52.0%) 6-10 (33.2%) >10 (14.8%)
6	Li et al., 2014, China	Cross-sectional	Five hospitals in Harbin, China	284	13 males and 271 females	28.10 ± 5.97	Bachelor and above (57.7%) Other (42.3%)	Nurses (55.3%) Senior nurses (28.2%) Supervisor nurses (13.7%) Chief nurses or deputy chief nurses (2.8%)	Married (40.1%) Unmarried (58.5%) Other (1.4%)	6.33 ± 6.85

TABLE 4: Negative leadership and silence measures with parameters used in the included studies.

Nos.	First author, year	Negative leadership type	Scales used by negative leadership	Negative leadership Mean \pm SD	The scale used in silence	Silence Mean \pm SD	Acquiescent silence	Defensive silence	Indifferent silence	Correlation coefficient (silence and negative leadership)
1	Li et al., 2024, China	Abusive supervision	Tepper et al. (2004)	1.31 \pm 0.48	Richard et al. (2021)	1.67 \pm 0.63	NA	NA	NA	0.40**
2	Farghaly Abdelaliem et al., 2023, Egypt	Toxic leadership	Zhang et al. (2020)	3.91 \pm 0.51	Knoll M et al. (2013)	4.90 \pm 0.72	5.52 \pm 0.63	NA	NA	-0.77**
3	Osei et al., 2022, Ghana	Abusive supervision	Tepper et al. (2004)	2.28 \pm 0.79	Parker et al. (2009)	2.73 \pm 0.77	NA	NA	NA	0.35**
4	Pang, 2022, China	Authoritative leadership	Interview	NA	Zheng et al. (2008)	3.19	3.73 \pm 0.85	3.38 \pm 0.95	2.47 \pm 0.78	NA
5	Zhang, 2021, China	Authoritative leadership	Zheng et al. (2000)	2.97 \pm 1.06	Zheng et al. (2008)	3.53 \pm 0.81	3.91 \pm 0.85	3.50 \pm 1.00	3.17 \pm 1.04	0.64**
6	Li et al., 2014, China	Abusive supervision	Tepper et al. (2004)	2.35 \pm 1.50	Zheng et al. (2008)	3.93 \pm 1.28	4.33 \pm 1.47	4.05 \pm 1.53	3.42 \pm 1.51	0.49*

* $p < 0.05$; ** $p < 0.01$.

this, in turn, influences their attitudes towards work, such as reduced work engagement. Furthermore, another experimental study found that when leaders showed cues that symbolized power, such as direct gaze and voice amplification (intentional or unintentional), subordinates were less vocal and remained silent [30]. Interestingly, for leaders with higher power and authority, the act of raising concerns or suggesting organizational changes can be perceived as a challenge to their management style. Consequently, nurses may choose to remain silent as a means of avoiding direct confrontation or contesting the leader's authority [9]. Moreover, Farghaly Abdelaliem et al. [12] found a significantly negative correlation between negative leadership behaviour and nurse's silence behaviour, reinforcing the previously raised research question of whether the relationship between negative outcomes observed in low-level negative leadership behaviours is appropriate for moderate and high-level negative leadership behaviours [31]. Currently, there is a research gap in the relationship between moderate-to high-level negative leadership behaviours and negative outcomes, and this study fills that gap in the existing literature.

Zhang [14] and Osei et al. [10] found that personality plays a mediating or moderating role in the relationship between negative leadership behaviour and medical staff silent behaviour and that different personalities influence silent behaviour in different ways and with diverse outcomes. Previous research found an association between neurotic personality and silent behaviour [32]. LePine et al. [33] showed that employees' introverted personalities can also impact silent behaviour, and employees with introverted personalities tend to use silence to reduce excessive communication with others. In addition to personality variables, the inclusion of the study showed that impression management motivation could also act as a mediating variable between negative leadership behaviours and nurses' silence [9].

Our findings contribute to the literature in several ways. First, our study extracted and condensed the research on the relationship between negative leadership behaviour and nurses' silence [34] in the medical field. Our findings reveal that negative leadership behaviour would lead nurses to withhold their suggestions and opinions from the organization and keep silent. This was consistent with most previous studies, as well as recent studies on the emergence of negative results such as increased stress [35], increased turnover intention [2], and decreased organizational performance [2, 36] due to leaders' abuse of power. Farghaly Abdelaliem et al. [12] found a negative relationship between negative leadership behaviour and nurse silence behaviour. Zhang et al. [37] also noted the positive impact of negative leadership behaviour in certain situations. Studies have confirmed that negative leadership behaviours do not always lead to negative consequences and can promote employee voice behaviour [38] and creativity [17] to a certain extent. This suggests that the negative behaviour of leaders and the silent behaviour of nursing staff may not just be a simple positive or negative linear relationship, but there may be a curvilinear relationship like a positive and then negative

influence. Fleishman et al. [39] pointed out that current research in the field of leadership focuses too much on a simple linear relationship and ignores the nonlinear relationship between the variables. Future research could focus more on whether there is a curvilinear relationship between the two. In addition, most previous studies [10, 12, 40] used nurses' silence as the mediating variable, but this study analysed nurses' silence as the dependent variable to understand the direct impact of negative leadership behaviour on nurses' silence. Second, most previous studies on negative leadership behaviour focused on the enterprise field, and few studies have examined the status quo of negative leadership behaviour and its impact on employee silence based on medical scenarios. The articles included in this study were all medical studies, which broadened the scope of our understanding of negative leadership behaviour. Finally, variables such as various personality traits played different roles in negative leadership behaviour and employee silence, which enriches the research literature on the relationship between negative leadership behaviour and employee silence [34].

4.2. Clinical Practice. Sweden, Canada, France, and South Korea have "workplace bullying laws" [40]. Therefore, from the perspective of leadership, hospitals, and other institutions can take various actions such as organizational culture guidance and regular management skills training for head nurses, department directors, and other leaders as a unit to improve leaders' awareness of negative management hazards, strengthen their self-control ability, and minimize the possibility of negative leadership behaviours [41]. Moreover, online and offline reporting centres can be set up in hospitals and other institutions to facilitate nurses or patients to report negative management at anytime and anywhere [40]. Managers in the medical field face greater pressure and challenges than other managers. Therefore, psychological counselling rooms can provide timely counselling when they encounter problems to prevent the occurrence of negative leadership behaviours. Organizations need to be highly attentive towards the psychological and physiological changes in nurses. This necessitates constant communication, understanding of nurse's psychological dynamics, and the establishment of a strong trust relationship. These efforts aim to effectively minimize silent behaviour among nurses. In addition, the implementation of diverse group-building activities can successfully alleviate work-related pressure, enabling nurses to effectively release negative emotions. In ordinary circumstances, fostering a peaceful and amicable atmosphere within the department becomes essential to encourage nurses' freedom of expression [41].

5. Limitations

This systematic review has several limitations. First, the number of selected studies was relatively small, which could lead to limited efficacy of our conclusions. Second, only four included studies focused on nursing staff; the bias estimated

may be inevitable. Third, the methodological quality of the included studies varied, potentially introducing a risk of bias. Fourth, using quantitative or statistically presented pooled evidence is preferable from a statistical perspective. However, performing a meta-analysis of the selected studies was challenging due to the inconsistent information provided. Fifth, the available limited, very low-quality evidence does not support an association between negative leadership behaviours and nurses' silence. Further studies are necessary to establish this connection. Finally, the lack of studies from developed Western regions in our inclusion criteria necessitates further exploration when extrapolating the study's results.

6. Conclusion

For the most part, it can be concluded that a significantly positive relationship exists between negative leadership behaviours and nurses' silence and that leaders' negative management behaviours lead nurses to choose silence for the sake of self-preservation. This phenomenon is detrimental to the physical and mental health of nurses. Hospitals and hospital leaders should increase their awareness of negative leadership and raise alarms or make improvements.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Zhi-Ying Li contributed to conception, design, and drafting of the manuscript. Zhi-Ying Li, Yu-Pei Yang, and Qian Wang contributed to acquisition, analysis, or interpretation of data. Tao-Hsin Tung and Hai-Xiao Chen contributed to supervision. Zhi-Ying Li and Yu-Pei Yang contributed equally in this study.

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Research Article

The Relationship between Emotional Intelligence, Job Satisfaction, and Organizational Commitment among First-Line Nurse Managers in Qatar

Mutaz I. Othman,¹ Anas Khalifeh ², Islam Oweidat,² and Abdulqadir J. Nashwan ¹

¹Nursing Department, Hamad Medical Corporation, Doha, Qatar

²Faculty of Nursing, Zarqa University, Zarqa, Jordan

Correspondence should be addressed to Abdulqadir J. Nashwan; anashwan@hamad.qa

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Background. Emotional responses and the ability to regulate emotions among nurses, especially first-line nurse managers, can influence various workplace dynamics. However, there is a knowledge gap regarding emotional intelligence, job satisfaction, and organizational commitment among nurses in Qatar, particularly first-line nurse managers. **Objectives.** The primary aim of this study is to determine if there is a significant relationship between emotional intelligence, job satisfaction, and organizational commitment among first-line nurse managers (FLNMs) in Qatar. **Design.** This is a descriptive cross-sectional correlational study. **Settings.** The research took place at Hamad Medical Corporation in Qatar. **Participants.** A total of 203 first-line nurse managers participated in the study. **Methods.** Participants were recruited using a convenience sample method. Data were collected using the Genos Emotional Intelligence Inventory—Concise, the three-component model Employee Commitment Survey, and the short-form Minnesota Satisfaction Questionnaire (MSQ). **Results.** The findings showed that participants had average levels of emotional intelligence, job satisfaction, and organizational commitment. Notably, a significant, moderately positive relationship was observed between emotional intelligence and organizational commitment, as well as between job satisfaction and organizational commitment. A weak positive relationship was identified between emotional intelligence and job satisfaction. Differences in emotional intelligence were observed based on variables such as gender, age, and unit specialty. Organizational commitment varied based on the current position and hospital type, while job satisfaction differed based on the current position and education level. **Conclusions.** The findings suggest that enhancing the emotional intelligence of first-line nurse managers can potentially improve organizational commitment, job satisfaction, and, subsequently, healthcare outcomes. There is a need for further research to delve deeper into these factors and devise strategies aiming to boost the emotional intelligence and job satisfaction of first-line nurse managers. **Implications for Nursing Management.** The study provides empirical data from Qatar's healthcare system, shedding light on FLNMs' emotional intelligence, job satisfaction, and organizational commitment.

1. Introduction

Leadership is a major challenge for healthcare organizations and nurse managers in the 21st century, as dynamic and rapid organizational and environmental changes require the availability of effective managers at all organizational levels. Nurses are a crucial component of the healthcare system, and nurse managers play an important role in ensuring quality patient care [1].

First-line nurse managers (FLNMs) are registered nurses with a license who work in a managerial position in a healthcare organization, typically at the operational level. They are in the position of managing and supervising a team of nurses, along with ensuring the seamless operation of the nursing unit [2]. FLNMs play a key role in nurse success and patient outcomes [1]. Therefore, it is important for them to focus on improving retention rates and meeting performance expectations [3]. FLNMs' performance has

a significant impact on job satisfaction and commitment [4]. Emotional intelligence (EI), on the other hand, has been shown to be an important factor in the workplace that affects job performance, job satisfaction, and organizational commitment [5]. The important role of EI in nursing comes from its impact on workplace harmony [6]. Also, EI involves controlling emotions, motivating others [7], fostering positive relationships, job satisfaction, and productivity as well [8, 9]. Healthcare managers along with FLNMs receive benefits from EI [9], FLNMs with EI influence quality of care, safety, staff nurse retention, and patient outcomes [10]. In contrast, a lack of EI in FLNMs leads to lower nurses' engagement, higher turnover, and lower staff nurse retention [11, 12]. As a result, EI fosters positive relationships and job satisfaction between nurses [5, 8].

Many FLNMs experience job-related stress due to insufficient knowledge and skills necessary for a challenging work setting [13]. Therefore, many FLNMs may not have been able to adapt to their position successfully.

FLNMs may lack knowledge and skills, causing stress and ineffective performance [13]. Incompetent FLNMs affects patient and staff nurses outcomes, so they required a competency-based and well-structured strategy for the development of FLNMs [2]. So, developing FLNMs with EI is crucial [2], but little study has been conducted on the EI of FLNMs [10]. EI can help retain and motivate FLNMs [14]. In general, it is believed that employees with more EI will perceive higher job satisfaction. This is due to the assumption that individuals with greater EI can develop strategies for dealing with potential stress-related consequences, while others with lower EI cannot. EI has been acknowledged as a crucial competency for healthcare professionals [4]. So, administrators and policymakers might use EI in healthcare as a strategy to develop organizational strategies for the retention and motivation of all FLNMs.

FLNMs play a vital role in nursing by bridging the gap between senior management and clinical nurses. The positive impact of enhancing EI and commitment among nurses and FLNMs leads to improved decision-making, care quality, and job satisfaction [15]. This will allow FLNMs to focus on building relationships and communicating well with nurses.

Job satisfaction, both intrinsic and extrinsic, refers to an employee's fulfillment with a particular job. The internal factors of an individual, such as personality and personal perspectives, as well as the exterior characteristics of the workplace, such as the work environment, can influence job satisfaction. Job characteristics can have an impact on an employee's wellbeing and affect job satisfaction and dissatisfaction [16]. Spector's definition of job satisfaction is one of the most common ones. It says job satisfaction depends on how a person feels about their job and all its parts [17].

An employee derives intrinsic satisfaction from the individual internal motivation when performing a certain task to achieve satisfaction, and as a result, satisfaction is derived from the staff member's active engagement in the assigned task [18–20]. On the other hand, extrinsic satisfaction derives from external elements such as money, promotion, and

the anticipation of receiving rewards [21]. Theories on human motivation, such as Maslow's needs hierarchy theory, Herzberg's motivator-hygiene theory, the job characteristics model, and the dispositional approach, are associated with theories on job satisfaction. This is due to the close relationship between the two sets of concepts [21].

On the other hand, organizational commitment is defined as a person's connection with and involvement in his or her current organization. This includes an individual's acceptance of the organization's objectives and values, along with a strong wish to continue working for that organization [22]. Job satisfaction and commitment are distinct concepts. Such a being emotionally attached to the organization indicates a deep loyalty to the organization.

Organizational commitment indicates that an employee cares about the organization's goals and values, whereas job satisfaction focuses on the employee's job [23]. John Meyer and Natalie Allen developed the organizational commitment theory [24].

Commitment in the workplace can be categorized into the following three dimensions: affective, normative, and continuous [24]. Affective commitment involves an employee's emotional attachment and involvement in their job. Normative commitment is when an employee feels obligated to stay loyal to the organization, often due to perceived investments made by the company or a desire to support colleagues. Continuous commitment is driven by concerns about the costs and benefits associated with leaving the organization, such as loss of compensation or potential gains from staying in the job. Job satisfaction and commitment have significant effects on the performance of FLNMs [25].

This study set the stage for future studies on the relationship between EI, job satisfaction, and organizational commitment among FLNMs in Qatar and other countries, along with factors that may affect that relationship.

This study aimed to examine the relationship between EI, job satisfaction, and organizational commitment among FLNMs in Qatar. This study intends to assess the emotional intelligence, organizational commitment, and job satisfaction levels among first-line nurse managers in Qatar and, in addition, examine differences based on demographic and organizational characteristics, as well as the relationships among these variables.

2. Methods

2.1. Design of the Study and Data Collection. A descriptive cross-sectional design examined the relationship between EI, job satisfaction, and organizational commitment. While this design provides a clear snapshot at a specific time, it has limitations, including the inability to establish causality [26]. The study involved ethical approval, online questionnaire use, and recruitment via email from the nursing corporation office and research nursing department to all target sample emails attached with a cover letter and questionnaire link. The survey was accessible on various devices, and invitations were sent through the research department to ensure equal opportunity. The data collection procedure took a total of four weeks. It involved sending an email two weeks after the

initial invitation and another reminder email three weeks later, and the survey took approximately 20 minutes to complete.

2.2. Participants and the Sampling Procedure. The target population for this study is FLNMs in Qatar. The accessible population was recruited from FLNMs among Hamad Medical Corporation (HMC) participants. HMC manages nine specialty hospitals and three community hospitals, and as well as being one of the largest employees in Qatar, HMC is the main healthcare provider in Qatar. Nonprobability convenience sampling was employed for those who met specific criteria, such as having managerial roles in the nurse and midwife career framework, holding a bachelor's degree, and working full time in selected hospitals for at least one year. The study used G*Power 3.1.9.7 software to calculate the required sample size, resulting in a minimum of 138 using a correlation test (power = 0.95, alpha = 0.05, two-tailed, and effect size = 0.3).

2.3. Instruments. The first section covers sociodemographic and professional characteristics such as age, gender, job position, educational level, years of experience as a nurse, years of experience as a first-line nurse manager, and nursing specialty unit. Then, three instruments were used to collect data in this study, reflecting each main variable in the study: the EI Genos Emotional Intelligence Inventory-Concise (self-assessment). For the Genos EI Inventory, one must use a 5-point Likert scale with 31 items. A 5-point Likert scale contains 31 items: 1 = almost never, 2 = seldom, 3 = sometimes, 4 = usually, and 5 = almost always. The questionnaire is specific to a workplace setting and takes 5–7 minutes to complete. Genos' instrument was selected because it has sufficient face validity, is clear and understandable, and is accessible. The scoring involves summing up the scores from different scales: Emotional Self-Awareness, Emotional Expression, Emotional Awareness of Others, Emotional Reasoning, Emotional Self-Management, Emotional Management of Others, and Emotional Self-Control. Each scale includes specific items, and the total Emotional Intelligence score is calculated by adding up the scores from all these scales. Percentile scores are used for interpretation, representing the percentage of individuals scoring below a particular raw score. The Genos EI Inventory provides percentile ranges, categorizations, and interpretive guidelines for scoring and interpretation [27]. The Genos EI Inventory (Concise) Scale's alpha reliability coefficient has been determined by previous research to be 0.86, and its subscale reliability is good enough [28].

The job satisfaction score was calculated using the short-form Minnesota Satisfaction Questionnaire (MSQ), developed by Weiss, Dawis, England, and Lofquist in 1967. The questionnaire consists of 20 items rated on a 5-Likert scale from 1 (dissatisfied) to 5 (very satisfied). Two factors, intrinsic and extrinsic satisfaction, are derived from the factor analysis of the 20 items. The general satisfaction score can be calculated by combining these two elements. The intrinsic

scale includes 12 items, while the extrinsic scale includes 6 items. Two items are part of the general satisfaction scale. Raw scores for each scale can be converted to percentile scores, with a score of 75 or higher indicating high satisfaction, a score of 25 or lower indicating low satisfaction, and a score between 26 and 74 indicating average satisfaction. The reliability coefficients for intrinsic satisfaction, extrinsic satisfaction, and general satisfaction are 0.86, 0.8, and 0.9, respectively [29].

The revised TCM Employee Commitment Survey by Meyer and Allen measures FLNM organizational commitment. It includes 18 items and six items measuring affective, continuance, and normative commitment [24]. The organizational commitment scores are calculated by computing averages for the Affective Commitment Scale (ACS), Normative Commitment Scale (NCS), and Continuance Commitment Scale (CCS) for each respondent. After reading each item, employees indicate the strength of their agreement by selecting a number from 1 (strongly disagree) to 7 (strongly agree). The implementation level of organizational commitment is determined by adding the range value to the level with the lowest mean score after obtaining the range value. Reports on reliability and validity show that this subscale has acceptable reliability ranging from 0.74 to 0.89 and construct validity via factor analysis confirming affective commitment as a distinct measure of organizational commitment [24]. This approach helps in effectively interpreting the data analysis and enhances the efficacy of data analysis and interpretation, which were computed using the subsequent formula [30]:

$$\text{Range Value} = \frac{\text{highest mean score} - \text{lowest mean score}}{\text{Number of level intended}} \quad (1)$$

A pilot study on 30 participants was conducted to assess survey clarity, filling time, analytic procedure, and participant response; the pilot subjects were not included in this study. Using Statistical Package for the Social Sciences (SPSS) Statistics version 26 software by IBM, the instrument's validity and reliability were evaluated using Cronbach's alpha coefficient, ensuring internal consistency and reliability. The instruments used for evaluation of Cronbach's alpha coefficient were the Genos Emotional Intelligence Inventory-Concise (self-assessment) (0.867), MSQ (0.939), and TCM Employee Commitment Survey (0.831). The study utilized English language instruments as the participants mainly spoke English.

2.4. Ethical Considerations. The study received ethical approval from Zarqa University and the Institutional Review Board (IRB) of the Medical Research Committee (MRC-01-23-058) at HMC. Email invitations were sent to participants with the assistance of the nursing corporate workforce. Participants were provided with an information sheet explaining the study, its risks and benefits, and their right to participate. Anonymity and privacy were maintained, and completed surveys were secured. Permission was obtained to use the research instruments.

2.5. Statistical Analysis. Statistical Package for the Social Sciences (SPSS) Statistics version 26 software by IBM was used for descriptive and inferential statistics. The data were coded, cleaned, and checked for normality assumptions. Data cleaning was performed to ensure the accuracy and reliability of the data. Frequencies and percentages describe sample characteristics. Independent *t*-tests and ANOVA tests examined differences in mean scores. Pearson's correlation explored relationships between variables.

3. Results

Out of 250 first-line nurse managers, 203 responded (81.2% response rate). As shown in Table 1, the majority were female (54.7%) and aged 35–44 years (61.6%). Most had a bachelor's degree (75.9%), while 24.1% had a master's degree. The majority had more than 10 years of nursing experience (83.2%) and more than 5 years as FLNMs (93.6%). Various positions, hospitals, and medical specialties are represented in Table 1.

The participants showed an average level of EI ($M = 49.87$ and $SD = 28.89$), with 42.4% above average and 41.4% below average, as shown in Table 2. The highest domain was emotional management of others ($M = 3.99$ and $SD = 0.62$), while the lowest was emotional expression ($M = 3.48$ and $SD = 0.54$), see Tables S1–S6 in the Supplementary Material for more details. As a result, as shown in Table 3, organizational commitment level averaged 4.55 ($SD \pm 0.83$); on the other hand, affective commitment scoring was the highest ($M = 4.72$ and $SD \pm 1.22$) and continuance commitment was the lowest ($M = 4.42$ and $SD \pm 1.05$), as shown in Table S2. The result represented in Table 4 shows that job satisfaction level had a mean score of 68.13 ($SD \pm 12.51$), with extrinsic satisfaction ($M = 3.90$ and $SD \pm 0.50$) higher than intrinsic satisfaction ($M = 3.47$ and $SD \pm 0.58$), as shown in Table S3.

On the other hand, the differences with sociodemographic and professional characteristics show that gender has a significant difference with EI ($t = 2.134$, $p < 0.05$), and age groups differ significantly ($F(3,199) = 3.25$, $p < 0.05$). Nursing unit specialties showed significant differences in EI ($F(12,190) = 2.58$, $p < 0.05$) also. On the other hand, current position, educational level, years of experience, and hospital type did not have a significant difference with EI, as shown in Table S4. While gender did not have a significant difference with organizational commitment ($t = 1.43$ and $p = 0.15$), the current position has a significant difference ($F(3,199) = 2.930$, $p < 0.05$), with head nurses reporting higher commitment. Hospital type influenced organizational commitment ($F(14,188) = 3.67$, $p < 0.05$), with primary hospitals having a significant difference in organizational commitment as shown in Table S5. Job satisfaction did not significantly differ based on gender ($t = 0.20$, $p = 0.84$), but educational level affected it ($t = 2.29$, $p < 0.05$), with bachelor's degree holders reporting higher satisfaction. The current position also affected job satisfaction ($F(3,196) = 3.70$, $p < 0.05$), with head nurses reporting higher satisfaction. Age group, years of experience, hospital type, and unit specialty did not have a significant difference with job satisfaction, as shown in Table S6. EI and organizational commitment had a moderate positive

TABLE 1: Sociodemographic and professional characteristics ($n = 203$).

Variables	Frequency (n)	Percentage (%)
Gender		
Male	92	45.3
Female	111	54.7
Age		
≤ 34	42	20.7
35–44	125	61.6
≥ 45	36	17.7
Educational level		
Bachelor	154	75.9
Master's	49	24.1
Experience in the nursing field		
6–10 year	34	16.8
11–15 years	90	44.3
16–20 years	41	20.2
> 21 years	38	18.7
Experience as first-line nurse manager		
1–5 year	13	6.4
6–10 years	75	36.9
11–15 years	54	26.6
> 16 years	61	30.1
Current position		
Head nurse	37	18.2
Charge nurse	79	38.9
Acting head nurse	16	7.9
Acting charge nurse	71	35
Type of hospital		
Primary hospital	66	32.5
Secondary hospital	34	16.8
Tertiary hospital	103	50.7
Nursing specialty unit		
Cardiology	7	3.4
Critical care	39	19.2
Emergency	13	6.4
Geriatric care	17	8.4
Surgical	26	12.8
Peri-operative	7	3.4
Operation theatre	6	3.0

TABLE 2: Level of emotional intelligence ($n = 203$).

Categorization	Frequency (n)	Percentage (%)
Very high	43	21.2
High	43	21.2
Average	33	16.2
Low	37	18.2
Very low	47	23.2

correlation ($r = 0.319$, $p < 0.01$), as EI and job satisfaction resulted in a weak positive correlation ($r = 0.262$, $p < 0.01$). While organizational commitment and job satisfaction show a moderately positive correlation ($r = 0.599$, $p < 0.01$), as shown in Table 5.

4. Discussion

This study was conducted to examine the relationship between emotional intelligence, organizational commitment,

TABLE 3: Level of organizational commitment ($n = 203$).

Categorization	Frequency (n)	Percentage (%)
Very high	10	4.9
High	85	41.9
Moderate	93	45.8
Low	14	6.9
Very low	1	0.5

TABLE 4: Level of job satisfaction ($n = 203$).

Categorization	Frequency (n)	Percentage (%)
High job satisfaction	68	33.5
Middle job satisfaction	77	37.9
Low job satisfaction	58	28.6

TABLE 5: Relationship between emotional intelligence, organizational commitment, and job satisfaction.

Variables	Organizational commitment	Job satisfaction
EI r	0.319 *	0.262 *
p value	$p \leq 0.001$	$p \leq 0.001$
OC r		0.599 *
p value		$p \leq 0.001$

Note. EI = emotional intelligence; OC = organizational commitment, *significant at the 0.01 level.

and job satisfaction among FLNMs in Qatar. Due to the dynamic nature of the healthcare sector and encountering new challenges, FLNMs' role in ensuring high-quality patient care and efficient operations has become increasingly crucial. The study revealed that FLNMs' EI level was average, which is consistent with findings from previous studies [15, 31–33]. However, some studies reported below-average levels of EI among FLNMs [34–36]. That may be because cultural and educational differences, workplace culture, job stress, and the workplace environment can influence EI. On other hand, according to the findings of this study, FLNMs exhibit a moderate to high level of organizational commitment [24, 37–40]. This may be attributable to their position within the organization, as they are linked to higher-level managers and administration, so they influence decision-making and have been perceived for their value in the organization. In addition, this may be attributable to the fact that they have been effective in the organization.

FLNMs' job satisfaction level was shown to be moderate to high [41–44]. In response to the study result, the instrument used in the instruction asked the participant to respond based on "how I feel about my current job." Since the level of job satisfaction corresponds with EI, EI is the ability to recognize, understand, and control one's own emotions as well as the emotions of others. In contrast, job satisfaction is a feeling of satisfaction or fulfillment that an individual gives to his or her job. It makes sense to think that people with higher EI are better able to control their feelings at work and, as a result, are more likely to be satisfied with their jobs. Since EI is closely related to how professionals exercise their

autonomy and manage their emotions, it makes sense that their EI would influence how they perceive and respond to these aspects of their job.

The study found that older FLNMs and those working in specialized units had higher EI scores than their peers. Also, research suggests that female tend to exhibit a higher level of EI in comparison to male. These findings are consistent with prior studies [45, 46]. EI is a skill that can be developed and enhanced through training and experience [47]. As FLNMs gain experience, they may develop greater EI skills that allow them to better understand and manage their own and others' emotions. A study conducted in Jordan to examine the relationship between emotional intelligence and nurse-nurse collaboration revealed that participants' gender, age, and years of experience were not significant factors in EI. Conversely, there were significant differences in EI based on nurse unit specialties and educational level [48]. Nursing personnel must be both curative and compassionate, especially during critical periods and end-of-life care, in line with the profession's core principles. This aspect of the work reinforces the performance-enhancing effects of EI on nurses. Gradually, this dependence on emotional intelligence may increase their awareness of their own emotional intelligence-related behaviors [36], allowing them to actively contribute to the provision of high-quality interdisciplinary care. Specifically, effective interactions between nurses and patients during end-of-life care could consistently foster a healing environment in the hospital. That is why you will see a difference in EI level based on age and nursing unit specialty.

The study found no significant association between emotional intelligence and level of education, current position, years of nursing experience, years of FLNM experience, or hospital type. These results are also consistent with previous studies [49, 50].

According to the results of this study, there was no significant difference in job satisfaction based on gender, age, hospital type, years of experience in the nursing field, years of experience as FLNM, or specialty. However, there were significant differences in job satisfaction based on current positions and levels of education.

A study examined job satisfaction among nurses in Egypt found no significant gender-based differences. These align with the study's findings [51]. The research also showed a significant difference in job satisfaction based on the educational level, with nurses holding a bachelor's degree reporting higher levels of job satisfaction than those with a master's degree, continuing to support the result.

In addition, a cross-sectional study on the job satisfaction of nurses in Saudi Arabia discovered that there were no significant differences based on gender, age, education level, or years of experience [52]. In another study, the authors investigated the relationship between organizational commitment and the job satisfaction of nurses in a Dubai hospital. They presented the results of their study and demonstrated the significance of different demographic factors, including age, education, years of experience, position, and specialization, on organizational

commitment and job satisfaction [53]. One more study found that those with postbasic nursing education reported significantly greater job satisfaction than those with only basic education ($p < 0.05$) [54].

A cross-sectional study conducted with a random sample of 5000 licensed nurses in the United States found that nurses' levels of job satisfaction did not vary by age, gender, educational level, or years of experience, except for hospital type, which had a significant difference in job satisfaction ($p = 0.02$), which also aligns with the study findings [55, 56]. According to the results of this study, there were significant differences in organizational commitment based on current position and hospital type. These findings are also consistent with prior studies.

A study investigated organizational commitment among nurses at a major public hospital in Saudi Arabia. Researchers revealed that participant gender, educational level, and years of nursing experience were not significant predictors of overall organizational commitment. Only age was a significant predictor of organizational commitment [57].

This research shows that the relative participation of males and females is not independent of other factors, given the issues in modern life, the equal gender combination in the workplace and organizations, and the social and cultural obligation for both males and females to participate in vocational activities. Therefore, other factors rather than gender affect FLNMs' organizational commitment.

Another study found that older nurses had higher level organizational commitment than younger nurses, nurses with higher education levels had higher organizational commitment than those with lower education levels, and nurse managers with more work experience had higher organizational commitment than those with less work experience [58].

Regarding hospital type, a multisite survey study was conducted and found no statistically significant differences in education level, current position, specialty, or hospital type [39]. One more study revealed a positive and significant association between organizational commitment and years of experience in the current position but no significant difference depending on age, gender, unit specialty, or educational level [59].

EI correlated positively with organizational commitment and job satisfaction [40, 56, 60–62]. FLNMs showed a positive relationship between organizational commitment and job satisfaction [53, 58, 63]. But it is important to remember that correlation does not necessarily indicate causation. However, it is possible that additional factors, such as salary, workload, or degree of job autonomy, may also influence their total satisfaction with their jobs.

The research findings have demonstrated that FLNM with high levels of emotional intelligence demonstrate an increased willingness to have positive attitudes towards their job and organization, leading to increased organizational commitment and job satisfaction. Furthermore, emotional intelligence can enhance FLNMs' understanding and control of their emotions, therefore promoting higher levels of job satisfaction and organizational commitment.

5. Limitations

There are a few limitations to this research. The current study's cross-sectional design is susceptible to usual biases, such as lower generalizability, including the inability to establish causality [26]. Furthermore, the implementation of self-assessment questionnaires could have generated self-report biases, such as "inflation" and "manipulation" biases. Indeed, the use of reliable and validated psychometric scales helped mitigate some of the self-report biases associated with self-assessment questionnaires. By employing established and well-tested instruments, researchers can enhance the credibility and accuracy of the data collected in the study. As an additional limitation, there could be other variables not included in the study that may influence the observed relationships. For instance, work-related stress, leadership style, or organizational support could have an impact on both emotional intelligence and job satisfaction. Furthermore, this limits the use of advanced methods of statistical analysis, such as linear regression.

6. Implications on Nursing Management

The study shows EI has a positive influence on job satisfaction and organizational commitment for FLNMs. Human resources should invest in EI training for FLNMs and consider it a core competency during recruitment. Nursing programs should invest in EI training programs and incorporate them into nursing curriculum content to prepare future nurses, while continuing education is essential. In addition, it is important to consider and incorporate these factors into nursing strategies and the policy-making process. Future research should prioritize conducting experimental studies to explore the potential impact of EI on job satisfaction and organizational commitment. It is important to consider a wide range of variables in these studies, including leadership, occupational stress, role stress, innovative behavior, social relations, and technology trends in the workplace.

Researchers should investigate the impact of emotional intelligence on the future of work and first-line nurse managers' perceptions of digital innovation in the workplace. By implementing these strategies, healthcare organizations can optimize their management practices and enhance workforce performance. Another variable that has been largely overlooked is the relationship between emotional intelligence and technology trends in the workplace.

7. Conclusion

This study highlights the importance of improving the emotional intelligence, job satisfaction, and organizational commitment of FLNMs in Qatar. Strategies include education, leadership development, and work culture. Implementing flexible work hours, recognition programs, and talent development can create a positive work environment, fostering job satisfaction and organizational commitment. Further research is needed to understand this relationship in different healthcare settings.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

The Institutional Review Board at the Faculty of Nursing, Zarqa University (Zarqa, Jordan), approved the study with the number of (5/2022) and the Institutional Review Board (IRB) of the Medical Research Center (MRC-01-23-058) at HMC. All methods were carried out following relevant guidelines and regulations or the Declaration of Helsinki.

Consent

Informed consent was obtained from all participants.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

MIO conceptualized the study. MIO, AK, IO, and AJN contributed to research design, data collection, analysis, literature search, and manuscript preparation. All the authors have accepted responsibility for the entire content of this manuscript and approved its submission.

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Supplementary Materials

See Tables S1–S6 in the Supplementary Material for comprehensive data analysis. (*Supplementary Materials*)

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Research Article

Relationship between Knowledge Management and Social Value among Iranian Nurses

Leili Rezaei ¹, Nahid Dehghan Nayeri ², Hadis Ashrafizadeh ³,
Fatemeh Hajibabae ⁴ and Roohangiz Jamshidi Orak ⁵

¹School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

²Department of Nursing Management, School of Nursing & Midwifery, Nursing and Midwifery Care Research Center, Tehran University of Medical Sciences, Tehran, Iran

³School of Nursing, Student Research Committee, Dezfoul University of Medical Sciences, Dezfoul, Iran

⁴Nursing and Midwifery Care Research Center, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

⁵Nursing Care Research Center, Iran University of Medical Sciences, Tehran, Iran

Correspondence should be addressed to Fatemeh Hajibabae; hajibabaeefateme@yahoo.com

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Aim. This study was conducted to determine the association between knowledge management and social value among nurses working in hospitals of Tehran University of Medical Sciences. **Background.** Knowledge management plays a significant role in healthcare systems. Healthcare providers require knowledge in every aspect of their work, and they must be able to rely on a knowledge management system to access the newest research and practice to ensure the highest quality of care. One of the evident goals of knowledge management is creating value in organizations. Creating value does not necessarily mean creating economic value, but creating social value is a category proposed as a prerequisite for knowledge management. **Methods.** This research is a descriptive-analytical study conducted in Tehran in 2021 on two groups of nurses ($N=228$) selected through a stratified random method. The data collection tools were Choi knowledge management questionnaire and a researcher-made questionnaire on social value validated in Iranian society. **Results.** There was a positive and significant correlation between the variables of knowledge management and social value in Bachelor of Science (BSc) nurses (P value ≤ 0.01 , $r=0.43$), and no significant correlation was observed in Master of Science (MSc) nurses (P value >0.05 , $r=0.14$). **Conclusions.** In the BSc nurses' group, a direct and significant association was found between knowledge management and social value of BSc nurses so that by increasing the score of knowledge management in the nursing community, individuals feel more self-worth, resulting in achieving a favorable level of customer satisfaction. **Implication for Nursing Management.** It is suggested that an accurate program should be designed for all academic levels of nurses in hospitals, the principal elements of creating knowledge and learning and its provision should be assessed, and the necessary measures should be taken.

1. Introduction

The necessity for rapid access to information in order to support decision-making in critical conditions in healthcare systems is inevitable. The world has undergone widespread changes during the recent decades culminating in new complications and challenges for all organizations, especially organizations that provide healthcare services. A new field called “knowledge management” has appeared to adapt to

these changes [1]. Knowledge management takes a great step towards efficient management by emphasizing learning, organizational thinking, a sense of cooperation, and approach orientation, encouraging individuals to express new ideas, forming an appropriate environment for expressing interests, and identifying individuals' abilities and capabilities and using them in executive affairs and decision-making and assigning them responsibility [2]. By using knowledge discovery in scientific and clinical research,

teaching, and other fields extensively to solve complicated problems and improve work efficiency, service provider systems are known as knowledge-based organizations that need skilled and knowledgeable staff [3]. Knowledge discovery, as the first step in the knowledge management process, turns information into knowledge and thereby helps healthcare service providers reduce information overload [4]. Knowledge, as an important resource, should also be managed effectively by the medical staff, particularly nurses, because organizations providing healthcare services need to collect, analyze, and turn data into information and knowledge for decision-making [5]. Having a clear understanding of the information required by nurses to design knowledge management systems is necessary [6]. Some of the positive consequences of knowledge management in the healthcare system are reduced medical errors, improved care quality, improved organizational learning, and increased collaboration, innovation, and reduced costs [7]. Nurses' knowledge management in different studies indicates different results. In Hassanian et al.'s study, knowledge management of the majority of nurses (60.4%) was reported at an average level [8], while in Lee et al.'s study, the mean score of nurses' knowledge management was 3.21 [9], requiring more examinations in the field of knowledge management among nurses. Also, considering the effect of educational levels on knowledge management, it is necessary to compare the knowledge management of nurses with different educational levels [10].

One of the evident goals of knowledge management is creating value in organizations. One of the most general ways to create value is to support efficient and effective decision-making. Creating value does not necessarily mean creating economic value, but creating social value is a category proposed as a prerequisite for knowledge management [11].

In the present organizational atmosphere, "social values" can make anything accessible, and without values, no action works [12]. These values are comprehensible, have an emotional burden, are shared among many individuals and groups, and are used as judgmental norms and a standard for discovering goals and ways to achieve them [13, 14]. Nursing is a profession manifesting its value in the relationship of the individual with the environment and colleagues. This profession provides precious services under challenging conditions to society, while every action contains a variety of values manifesting its actual meaning [15]. Social and moral values include new fields previously mentioned by Florence Nightingale [16]. Nursing social value is a fundamental value in this profession that can foster in the nurse simultaneously with providing nursing care, and this value can be promoted via training so that despite the crises experienced in society, promotes the individuals' perception of the field of nursing and its social value [15]. As a social action, nursing has a variety of values that give it meaning, i.e., these values reflect the practical principles of nursing and build nursing care based on them [15]. Among the most crucial values are social values. The results of a study conducted to determine the social values affecting patient-nurse interactions indicated that the most important social values influencing the patient-nurse relationship included affection or compassion,

honesty in words and actions of nurses, and justice and equality in benefitting from medical facilities and nursing services [17]. It is noteworthy that according to Gallup's annual report, nurses have been chosen for the 20th consecutive year by the population of the United States as the specialists who have gained the most trust due to their honesty and ethics, and with 81%, they ranked higher than doctors, teachers, and pharmacists [18]. Moreover, the findings of another study indicate that the value that society places on nursing is positive and is viewed as a profession necessary to improve individuals' health [19].

Despite the numerous advantages of knowledge management, not much research has been conducted on knowledge management and social value in nursing in hospitals, particularly among nurses facing with so much data in various situations. Socialization has not taken place in nursing. A notable point here is that despite the importance of recognizing the variables' positive effects, the resources still have not obtained accurate information regarding the interaction and relationship between these variables in nurses; therefore, by tracking information accurately and recognizing the variables and their role in the nurses' organizational performance exactly, the research team conducted the current research to determine the relationship between knowledge management and social value among nurses working in hospitals of Tehran University of Medical Sciences.

2. Methods

2.1. Study Design. This research is a descriptive-analytical study conducted in 2020 in all public hospitals of Tehran University of Medical Sciences.

2.2. Study Participants. The research population included all BSc ($N=4376$) and MSc ($N=213$) nurses working in public hospitals affiliated with Tehran University of Medical Sciences. The sample size was calculated using the pilot study's correlation coefficient (0.26) for type I statistical error to be 0.01 based on the formula ($n = (z/w)^2 + 3$) with ratios ($w = 1/2 \ln(1 + r/(1 - r))$) [20, 21], and finally, considering 15 probable drops, 112 people were determined as two separate research populations for each of the two groups of MSc and BSc nurses. Nurses were selected using a stratified random sampling method with allocation proportional to the size of the categories in the society so that 14 hospitals affiliated with Tehran University of Medical Sciences were regarded as categories. Based on the number of nurses working in each category, the number of nurses required in each category (hospital) was calculated using mathematical proportionality. After determining the number of nurses in each hospital, the number of nurses that should be placed in the research sample was specified using a table of random numbers. After going to each hospital and providing the random numbers to the nursing office, the researcher received the phone numbers of the sample individuals using the staff list and sent the research questionnaire to them. It should be mentioned that although the sample size was 112

people based on the formula, since the results of the proportionalities resulted in gaining decimal numbers, rounding off the numbers resulted in adding 2 units to the sample size. Thus, the final sample size was obtained at 114 in each group.

2.3. Study Tools. The data collection tools in this study consisted of three parts.

The first part was regarding demographic characteristics, including gender, age, marital status, education level, type of employment, service record, service department, and service record in the department.

The second part was Choi knowledge management questionnaire (2005) [22] designed specifically for nurses containing 23 items with a five-point Likert scale: five items regarding knowledge sharing culture, 6 items regarding nursing management system, 4 items regarding creative management leadership, 5 items regarding organizational learning, and 3 items regarding the performance outcomes-based reward system. The options of this scale are completely agree (5), agree (4), no idea (3), disagree (2), and completely disagree (1). The range of attainable scores in this questionnaire is 23–115. Higher scores denote higher levels of knowledge management. The questionnaire's validity and reliability were assessed and approved in Lee et al.'s [9] study, and Cronbach's alpha was reported as 93% [9]. Since Choi knowledge management questionnaire had not been ever translated into Persian, the translation-back-translation process was performed after asking for permission and consent to translate the mentioned questionnaire. After completing the translation process and performing face validity and content validity, the test-retest method was used to determine the knowledge management questionnaire's reliability. For this purpose, according to the opinion of the statistical consultant, the questionnaires were filled out by 20 nurses working in Imam Khomeini Hospital Complex and Shariati Hospital (10 nurses each) selected randomly. After two weeks, the questionnaires were provided to the same nurses again to respond, and the correlation coefficient was then calculated between the two groups of obtained data. The correlation coefficient for the knowledge management questionnaire was reported to be 0.8.

The third part of the social value questionnaire was researcher-made. Despite the existence of a number of tools in this field, none of them had been used specifically in nursing [23, 24]. According to the characteristics and conditions of the nursing profession, a researcher-made tool was designed from a combination of different tools [17, 23, 24]. It was provided to 10 faculty members of the Faculty of Nursing and Midwifery to assess and approve the qualitative and quantitative content validity and face validity. The primary number of questions was 45 questions, and after the faculty members' expert opinions and removing questions with the same concept, 29 questions remained. The content validity index (CVI) and content validity ratio (CVR) of the social value questionnaire in this study were calculated as 0.81 and 0.73, respectively. The test-retest method was used to determine the reliability of the social value questionnaire. For this purpose, according to the statistical

consultant's opinion, the questionnaires were completed by 20 nurses working in Imam Khomeini Hospital Complex and Shariati Hospital (10 nurses each) selected randomly. After two weeks, the questionnaires were provided to the same nurses again to respond, and the correlation coefficient was then calculated between the two groups of obtained data. The correlation coefficient for the social value questionnaire was reported to be 0.79. It should be mentioned that these 20 people were excluded from the research sample and the data obtained from them were not used.

2.4. Study Processes. Considering the coronavirus disease-2019 (COVID-19) epidemic and its resulting restrictions, data were collected as self-reports by the investigated units, and the questionnaires were sent online. Sampling was performed after confirming the questionnaires' validity and reliability. Because of the restrictions for the continuation of the COVID-19 epidemic, an in-person referral was not possible for the researcher; therefore, online sampling was performed by sending the questionnaire link to the cell phone and email of the selected research unit, which was designed by the researcher in Porsline software (<https://lilirezaei.digisurvey.net/40bmd>). After filling out and sending the questionnaire by the research units, the data were saved and retrieved in the researcher's email box. The questionnaire was designed in such a way that the research units were able to read, complete, and send the questionnaire as a self-report by spending approximately 10 minutes. They were supposed to answer all questions to submit successfully.

2.5. Study Analysis. After entering into SPSS software version 16, the data were statistically analyzed. First, given the participants' responses to the questionnaire questions, the scores obtained by them for the two main variables of the research, i.e., the knowledge management was calculated and classified into the following five scores: very few, few, neutral, high, and very high, and social value was calculated and classified into the following four scores: very low, low, neutral, high, and very high. In order to achieve particular goals and describe the research's main and background variables, descriptive statistics, including frequency distribution tables, central indices such as mean, dispersion indices such as standard deviation, were used for quantitative variables such as age, work experience, knowledge management, and social value, and inferential statistics including the independent *t*-tests, chi-square, analysis of variance (ANOVA), and the nonparametric Mann-Whitney *U* test were used for significant difference of variables between the two groups.

3. Results

Based on the research findings, the mean \pm SD age of BSc and MSc nurses is 35.89 ± 7.23 and 39.41 ± 7.50 , respectively. Furthermore, the mean work experience for BSc nurses was 11.86 ± 7.35 and for MSc nurses was 14.94 ± 7.05 . Other demographic information is presented in Table 1.

TABLE 1: Demographic and clinical characteristics of the nurses participating in the study by academic degree.

Variables	Bachelor nursing		Master sciences nursing		Test statistics	P value	
	N	%	N	%			
Gender	Female	94	82.5	88	77.2	$\chi^2 = 0.98$	0.32
	Male	20	17.5	26	22.8		
Age	20–25	9	7.9	0	0	$T = -3.60$	≤ 0.01
	26–30	23	20.2	19	16.7		
	31–35	25	21.9	17	14.9		
	36–40	29	25.5	30	26.3		
	41–45	16	14	20	17.5		
	46–50	9	7.9	23	20.2		
	51–55	3	2.6	3	2.6		
	56–58	0	0	2	1.8		
Marital status	Single	38	33.3	40	35.1	$\chi^2 = 0.14$	0.70
	Married	76	66.7	72	63.2		
	Divorced	0	0	2	1.7		
The university obtained the last degree	Free cities	26	22.8	8	7	$\chi^2 = 28.46$	≤ 0.01
	Azad Tehran	13	11.4	12	10.5		
	Azad Research Sciences	0	0	1	0.9		
	Tehran, Beheshti, Iran	26	22.8	60	52.6		
	Rehabilitation	0	0	4	3.5		
	Baqiyatallah	1	0.9	2	1.8		
	Shahed Tehran	2	1.8	1	0.9		
Government of the cities	46	40.03	26	22.8			
Having a degree other than nursing	Yes	16	14	24	21.1	$\chi^2 = 1.94$	0.16
	No	98	86	90	78.9		
Another type of educational qualification	Medically related	8	50	9	37.5	$\chi^2 = 0.61$	0.43
	Nonmedical related	8	50	15	62.5		
Employment status	Permanent	57	50	92	80.8	$\chi^2 = 35.74$	≤ 0.01
	Contractual	17	14.9	16	14		
	Corporate	16	14	3	2.6		
	Projective	17	14.9	0	0		
	Temporary	7	6.2	3	2.6		
Work experience	Less than a year	6	5.2	0	0	$T = -3.22$	≤ 0.01
	1–4	18	15.8	13	11.4		
	5–9	23	20.2	14	12.3		
	10–14	27	23.7	31	27.2		
	15–19	18	15.8	21	18.4		
	20–24	17	14.9	25	21.9		
	25–29	5	4.4	10	8.8		
Ward section	Intensive care	39	34.2	42	36.8	$\chi^2 = 22.96$	≤ 0.01
	Emergency	9	7.9	8	7		
	Internal	16	14	14	12.3		
	Surgery	17	15	11	9.6		
	Children	8	7	2	1.8		
	Nursing station	8	7	30	26.3		
	COVID-19	6	5.3	1	0.9		
	Other	11	9.6	6	5.3		
Work experience in the current ward	Less than a year	20	17.5	7	6.1	$T = -0.57$	0.56
	1–4	35	30.7	36	31.6		
	5–9	26	22.8	35	30.7		
	10–14	18	15.8	24	21.1		
	15–19	10	8.8	8	7		
	20–24	5	4.4	4	3.5		

TABLE 1: Continued.

Variables	Bachelor nursing		Master sciences nursing		Test statistics	P value	
	N	%	N	%			
Shift work	Fixed morning	27	23.6	44	38.6	$\chi^2 = 3.85$	0.14
	Fixed era	4	3.5	2	1.8		
	Fixed night	2	1.8	1	0.9		
	Rotating shift	43	37.7	34	29.8		
	Morning-evening	31	27.2	24	21		
	Evening-night	5	4.4	7	6.1		
	Morning-night	2	1.8	2	1.8		
Employment in another hospital	Yes	11	9.6	9	7.9	$\chi^2 = 0.21$	0.64
	No	103	90.4	105	92.1		
Total		114	100	114	100		

The research results indicated that the mean \pm SD score of knowledge management in BSc nurses was 78.12 ± 16.13 and in MSc nurses was 75.96 ± 19.47 . Over one third of the individuals in both investigated groups had a knowledge management score between 79 and 96, which is high. None of the BSc nurses gained a score under 42 and the mean score of this group was higher than that of the MSc group. Although according to the statistical test the existing difference was not significant, it can be said that the two groups had almost the same situation regarding the knowledge management score.

Moreover, the mean \pm SD score of social value and the score range in BSc and MSc nurses are 121.15 ± 11.82 (74–145) and 122.18 ± 10.88 (90–144), respectively. Over half of the investigated individuals have gained a very high score (122–145) in evaluating social value. Although given the lowest score and mean score the MSc nurses group is in a better situation regarding social value than the BSc group, the present difference is not to the extent that the statistical test shows it to be significant. Therefore, the two investigated groups are identical regarding the social value score (Table 2). Also, a positive and significant correlation was observed between knowledge management and social value in BSc nurses (P value ≤ 0.01 , $r = 0.43$), but there was no significant correlation in MSc nurses (P value > 0.05 , $r = 0.14$) (Table 3).

4. Discussion

The present research was carried out to assess the relationship between knowledge management and social value in nurses working in the hospitals of Tehran University of Medical Sciences.

4.1. Nurse's Knowledge Management. The results of this research indicated that over one-third of all participants in each group (BSc and MSc nurses) had high knowledge management in the range of 79–96; in other words, they are located in a range indicating that their level of knowledge management is high. In the BSc nurses' group, no nurse was placed in the very low range of knowledge management.

Moreover, no significant difference was reported regarding knowledge management between the two groups of BSc and MSc nurses. The high level of knowledge management in nurses causes them not to be anxious in administrating affairs in dealing with unpredicted events. Therefore, there is constantly an answer for each possible question and they solve the patients' problems with their knowledge. The high level of knowledge management in nurses necessitates their better perception of medical issues of the day, and this important issue directs them towards having higher social values. This study was consistent with Jahanbani et al.'s [25] study which reported the knowledge management state as desirable [25]. Despite the limited number of studies investigating the use of knowledge management technology in developing countries, particularly in Iran, studies indicate that the skills and awareness of the use of knowledge management technology are very low among healthcare service providers [26]. In supporting the abovementioned concept, Adane et al. showed in a report on the use of computers and the Internet by nurses in a Nigerian educational hospital that only 43% of the nurses could use knowledge management [27]. Similarly, only 33% of the health specialists in Ethiopia use knowledge management technology for various purposes [26]. In another study, Hosseini-Zahmatkesh et al. [28] evaluated the knowledge management level of nurses at an average level, which was inconsistent with the findings of the current research [29]. The difference between the mentioned study and the current research is that this study has merely investigated the community of BSc nurses and has used a different questionnaire [28]. Ahsan et al. [30] carried out another study to investigate the role of nursing care education based on knowledge management in infection prevention. In this study, the knowledge management level of nurses was assessed based on the pretest and post-test, indicating that after receiving training, the knowledge level of nurses was promoted by 38%. The mean score of knowledge management in the pretest was 56% and in the post-test was 85%. Their study and the current research are different in terms of different knowledge management questionnaires, the different number of samples, and different methods [30]. Since today's successful organizations are organizations that have

TABLE 2: Determining the score of knowledge management and social capital according to the level of education of nurses.

Variables	Bachelor nursing		Master sciences nursing		Test statistics	P value	
	N	%	N	%			
Knowledge management	23–41 (very few)	0	0	4	T = 0.91	0.36	
	42–59 (few)	17	14.9	22			19.3
	60–78 (moderate)	40	35.1	32			28.1
	79–96 (high)	45	39.5	39			34.2
	97–115 (very high)	12	10.5	17			14.9
	Total	114	100	114			100
Social value	29–52 (very low)	0	0	0	T = -0.68	0.49	
	53–75 (low)	1	0.9	0			0
	76–98 (moderate)	3	2.6	3			2.6
	99–121 (high)	48	42.1	42			36.9
	122–145 (very high)	62	54.4	69			60.5
	Total	114	100	114			100

Note. The knowledge management was calculated and classified into five scores as follows: very few, few, moderate, high, and very high. Social value was calculated and classified into five scores as follows: very low, low, moderate, high, and very high.

TABLE 3: Association between two variables in two separate groups.

Variables	Groups			
	Bachelor science group		Master science group	
	r	P value	r	P value
Knowledge management and social value	0.43	≤0.01	0.14	≤0.01

been able to induce or acquire new knowledge and use it practically in improving and promoting their activities, hospitals should also pay attention to this crucial matter, provide the required context, and encourage nurses to benefit from new and scientific methods to reform their performance.

4.2. Nurse's Social Value. The results of this study also indicated that over 50% of the nurses in both groups had a high level of social value. Zarei et al. (2011) reported in their research a high mean score of value perceived by inpatients. These findings reveal a high capacity to promote the value of services provided in hospitals. Guimaraes et al. [15] carried out a qualitative study to identify and perceive social value in the discourse of graduate nursing students and found that social value could be identified and perceived in the discourse of nursing students, being manifested in care pragmatism based on solidarity. As a result, the students acknowledged social value as the main trait in this profession. In the clinical setting, in contact with the patient and his/her family, the students were able to take the social value into consideration using sympathy and consider it necessary for nursing care, recognize patients as human beings, and value them. Students cared about patients not only from a physical-biological viewpoint but also due to their belief in humanity. It means they understood patients as individuals and tried to communicate with them through dialogue [15]. Yang et al. reported that nurses significantly influence the general population [31]. Glerean et al.'s study also displays an image of nursing that is precious to people and is definitely necessary for them [32]. In another study, Vega et al.

indicate high levels of trust in nurses and report that 97% of the users welcome nurses in their homes, 76% consider nurses reliable to apply new techniques, and 50% know nurses as reliable to prescribe medication [33], which the results of all these studies are the same as the findings of the current research. However, Pierrotti et al.'s study, although has considered nurses as important as doctors, reported that doctors have more credit than nurses [34]. According to the findings of Girvin et al.'s study, the nursing profession is sometimes not recommended by school vocational counselors or family members since it is not regarded as an ideal career [35]. On the contrary, in Vega et al.'s study, 73.4% of the respondents knew this profession as an acceptable career to be recommended to their loved ones [33]. Some studies indicate that nurses are generally depicted in the newspapers as professionals with a secondary role concerning another profession having low responsibility, independence, or decision-making capacity. It is also recognized as an uninteresting and challenging career, without creativity and responsibility, with few opportunities for growth or promotion, low scientific level, low salary, and low social position [35, 36]. On the contrary, the findings of Vega et al.'s study disagreed with the image of the nursing profession depicted by the media due to injustice regarding the profession's social position or prestige [33]. Some websites belonging to official institutions and healthcare centers suggest the superiority of medicine over other health professions [35]. The results of these studies differ from the findings of the present research, which may be due to different contexts of the nursing profession in different countries, the type of social value recommended in the study, the tools used, and the comparison of nursing with some other professions.

4.3. Relationship between Knowledge Management and Social Value. Finally, the results of this study indicated that the scores of knowledge management and social value in the BSc nurses' group had a statistically significant positive association in such a way that as the score of one of the variables increases, the score of another variable also increases, while no such association exists in the MSc nurses group. No study was found that has investigated the association between these variables. Perhaps one of the possible causes of the lack of association between the knowledge management and social value in the MSc nurses' group is that social value is fully formed in these nurses and is not related to other variables including knowledge management. However, Fulk and Yuan et al.'s study indicates that the clarity of individuals' interaction in the organizational social network value helps scholars acquire knowledge-related materials, leading to facilitating interaction with knowledge sources. Hence, the organizational social network value among social media programs is superior to traditional knowledge management systems in eliminating these challenges [37]. According to Ellison et al., organizational social network values culminate in improving knowledge sharing in multinational organizations via raising social capital, supporting relationships, and mutual effects. Organizational social network values make it possible to create knowledge management with various benefits according to the levels of control and interaction [38]. Furthermore, using organizational social network values is positively linked to staff performance [38]. It can be said that one of the obvious goals of knowledge management is to create value in organizations. Knowledge management can pave the way to promote the organization's performance and achieve the sublime goals correctly by integrating the organization's social value in different departments and directly affecting concepts such as customer orientation, organizational learning, leadership, and intelligent management and decision-making, generating new knowledge, turning implicit knowledge into explicit knowledge, and paying attention to individuals' and experts' knowledge. The abovementioned items are among the principal functions of knowledge management that organizations need to achieve their goals. The abovementioned items are among the knowledge management functions that organizations strongly need to achieve their goals.

4.4. Limitations. The statistical population of the present research consisted of BSc and MSc nurses working in the hospitals of Tehran University of Medical Sciences; therefore, the results of this study may be generalized to other societies and universities of medical sciences cautiously. Using the questionnaire is considered a limitation in such a way that a questionnaire assesses individuals' attitudes, not the reality, which can be viewed as a limitation. Moreover, when responding, nurses may think that the actual response harms them and respond conservatively, and consequently, the results may be doubted and threatened.

4.5. Implication for Nursing Management. It is suggested that an accurate program should be designed for all academic levels of nurses in hospitals, the principal elements of creating knowledge and learning and its provision should be assessed, and the necessary measures should be taken. Moreover, a platform should be formed for the acceptance of using knowledge management on behalf of each organization's staff by revealing the importance of this matter through participation, organizational commitment, extending staff's communication, and using virtual education platforms. In the meantime, simultaneously with creating and developing knowledge management and the affecting factors, the organization's managers should further emphasize the internalization and socialization of knowledge and focus less on its integration, which can promote clients' satisfaction and organizational productivity.

5. Conclusions

Based on the results of this study, knowledge management is directly and significantly related to social value in the BSc nurses' group so that by increasing the score of knowledge management in the nursing community, individuals feel more self-worth, resulting in achieving a favorable level of customer satisfaction. Due to large numbers of staff, professors, students, and beneficiaries at various levels, medical sciences and nursing require strong and coherent infrastructural dimensions regarding knowledge management.

Data Availability

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Ethical Approval

The current study was approved by the Ethics Committee of Tehran University of Medical Sciences and was registered under the registration number: IR.TUMS.FNM.-REC.1399.229. Before the commencement of the project, all required permissions were obtained. Moreover, the participants were assured of the confidentiality of the information and the possibility of withdrawing from the study at any stage.

Disclosure

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

F.H, L.R, and N.DN, were involved in designing the idea and preparing the proposal. Data collection was performed by L.R and H.A and data analysis was performed by R.JO and H.A All researchers have participated in data interpretation, preparation, and article preparation.

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Research Article

Relationship between Empowering Leadership and Stress in a French University Hospital: A Cross-Sectional Study Combining the Measurement of Perceived Stress and Salivary Cortisol

Baptiste Cougot ^{1,2,3,4} **Nicolas Gillet**^{3,5} **Leila Moret**^{2,6} **Jules Gauvin**^{1,4} **Pascal Caillet**² **Ghozlane Fleury-Bahi**⁷ **Johan Lesot**⁸ **Florian Ollierou**^{1,4} **Anne Armant**^{1,4} **Arthur Peltier**⁴ **Evelyne Fouquereau**³ **Isaac Getz**⁹ **Kalyane Bach-Ngohou**^{10,11} and **Dominique Tripodi**^{1,6}

¹Nantes University, Nantes University Hospital, Department of Occupational Medicine and Environmental Health, Nantes F-44000, France

²Nantes University, Nantes University Hospital, Department of Public Health, Nantes F-44000, France

³EE1901 QualiPsy, Department of Psychology, Tours University, Tours F-37000, France

⁴IGEIA, Audit Intervention Formation Recherche en Santé, Nantes F-44000, France

⁵Institut Universitaire de France (IUF), Paris F-75000, France

⁶Nantes University, Tours University, Nantes and Tours University Hospitals, INSERM, Methods in Patients-Centered Outcomes and Health Research, SPHERE, Nantes F-44000, France

⁷EA4638 LPPL, Department of Psychology, Nantes University, Nantes F-44000, France

⁸SSTRN "Nantes Region Occupational Health Department", Nantes F-44000, France

⁹ESCP Business School, Paris F-75011, France

¹⁰Nantes University, Nantes University Hospital, Department of Biochemistry, Nantes F-44000, France

¹¹Nantes University, UMR 1235 INSERM TENS "The Enteric Nervous System in Gut and Brain Disorders", Nantes F-44000, France

Correspondence should be addressed to Baptiste Cougot; baptiste.cougot@chu-nantes.fr

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Aim. We investigated the impact of empowering leadership on both perceived stress and salivary cortisol, a commonly utilized biological indicator for stress assessment. **Background.** Empowering leadership is gaining increasing interest in companies. However, the impact of empowering leadership on stress is still insufficiently explored, with conflicting findings within the literature on this topic. While certain studies indicate that empowering leadership reduces perceived stress, other studies have suggested that empowering leadership could be stressful. **Methods.** We conducted a cross-sectional study using a questionnaire among a sample of 397 participants working in a French hospital. Participants' salivary cortisol was assessed. All analyses exploring the relationships between empowering leadership, perceived stress, and salivary cortisol were performed using multiple imputation methods. **Results.** Empowering leadership could simultaneously increase and decrease perceived stress. Specifically, although the empowering leadership global factor showed a negative correlation with perceived stress, some specific empowering leadership behaviors were positively associated with perceived stress. However, salivary cortisol was positively related to perceived stress and strictly negatively related to empowering leadership. Furthermore, salivary cortisol could be explained by a significant interaction effect between perceived stress and empowering leadership, indicating that empowering leadership enables employees to cope with perceived stress. **Conclusions.** Although empowering leadership was an ambiguous antecedent of perceived stress, our findings suggested that empowering leadership was a protective factor against increased salivary cortisol. These results suggest that empowering leadership behaviors could prevent biological stress. **Implications for Nursing Management.** While empowering leadership showed a protective effect on salivary cortisol, it is essential for managers to adopt the full set of empowering leadership practices to guarantee protective effects on perceived stress. This trial is registered with NCT04010773.

1. Introduction

Managerial practices aiming to foster employees' autonomy, such as empowering leadership, are gaining interest in companies [1, 2]. Unlike traditional leadership behaviors that consist of motivating employees through rewards (e.g., promise of bonuses) or threats (e.g., threat of blame or sanction; [3]), empowering leadership aims to motivate employees by increasing their power over their professional role and settings [4]. Two main categories of behaviors can be distinguished within empowering leadership: behaviors of power sharing with the employees and behaviors of support of the employees' autonomy [4]. Under these managerial conditions, the employees can not only exercise autonomous control over their thoughts and behaviors (i.e., self-leadership) and thus make concrete experiences of self-determination and self-efficacy but also impact and meaningful experiences at work (i.e., psychological empowerment [5]). These psychological experiences are intrinsically satisfying [6], and they, in turn, promote the identification of employees with their work and their increased occupational commitment [7] and improve the company's performance [8].

While the benefit of this type of leadership for the efficiency of companies is well established [8], its impacts on health remain understudied, with conflicting findings within the literature on this topic [9]. On the one hand, empowering leadership was found to reduce stress by fostering resource development and thus enabling the employees to meet their work requirements [10, 11]. However, these effects were low [10, 11]. On the other hand, in contrasting investigations, empowering leadership was suspected to promote occupational stress [12]. More specifically, they have suggested that the autonomy resulting from empowering leadership may represent a cognitive demand that induces stress for employees [12, 13]. Hence, additional studies designed to clarify the impact of empowering leadership on stress are needed. Beyond the scientific interest, this would enable us to make recommendations for the implementation of empowering leadership, with the aim of preventing possible negative effects in terms of stress. By conducting this research, our aim is to further understand how empowering leadership influences stress. More specifically, by developing two original perspectives, we aim to clarify the valence of the association between empowering leadership and stress and to improve our comprehension of the mechanisms underlying this link.

First, we examined the effects of empowering leadership on perceived stress and on salivary cortisol, considered as a biological indicator of stress [14]. As a steroid hormone, cortisol is secreted, under the regulation of the hypothalamic-pituitary-adrenal axis, by the adrenal glands. It helps to regulate energy and cellular metabolism all along the day [15]. Cortisol secretion exhibits cyclic biological variations, increasing in the second part of the night leading to a peak following awakening and a decrease during the day, with the

lowest level at night [16, 17]. Upon exposure to a stressful situation, the activation of the hypothalamic-pituitary-adrenal axis intensifies, triggering an increase in secretion. This response aims to prepare the organism to effectively cope with stress [14]. The cortisol level, therefore, appears as a relevant marker of the activation of the biological mechanisms of the stress response [14, 16]. Salivary cortisol level is the most widely used parameter because it measures the free (and active) level of cortisol and because of the simplicity and the noninvasive side of its collection [17, 18]. Although perceived stress triggers the activation of these biological mechanisms [19], it does not capture the biological mechanisms of stress [14, 16]. Accordingly, completing perceived stress measurement with the assessment of salivary cortisol could provide stronger evidence of the effect of empowering leadership on stress. Two alternative models for assessing the association between empowering leadership and salivary cortisol were tested. First, given the precursor role of perceived stress in the activation of biological mechanisms [19], the mediating effect of perceived stress on the relationship between empowering leadership and salivary cortisol was studied.

Hypothesis 1. The effect of empowering leadership on cortisol will be mediated by perceived stress.

The moderating effect of empowering leadership on the relationship between perceived stress and salivary cortisol was then investigated. Indeed, empowering leadership promotes employees' behavioral engagement in the transformation of their environment in order to develop their resources and their ability to cope with job demands [20]. However, the literature indicates that the effect of perceived stress on health can be mitigated depending on the efficacy of the individuals' coping strategies [21, 22]. Consequently, it may be assumed that empowering leadership will decrease salivary cortisol by allowing employees to effectively cope with perceived stress.

Hypothesis 2. Empowering leadership will moderate the effect of perceived stress on cortisol, with a weaker effect of perceived stress on cortisol when empowering leadership increases.

In addition, we attempted to distinguish the overall effect of empowering leadership from that of each of its specific component behaviors, using bifactor models [23]. Bifactor analyses consist of specifying both a global factor defined by the entire set of items and the specific factors [23]. Once the global factor has been estimated (i.e., when the globality has been taken into account), the specific factors are estimated using the residual information [23]. As mentioned earlier, prior research has indicated that empowering leadership power-sharing behaviors could be a stressful demand [12]. Conversely, empowering leadership-related supportive behaviors could be an occupational resource, since they would allow employees to deal with the autonomy-related demands [4]. Briefly, empowering leadership might have contrasting

effects contingent on the empowering leadership behaviors considered. Such a method could allow highlighting in an original way the possible contrasting impacts of empowering leadership on stress that has been suggested [12]. Considering the lack of previous studies relying on bifactor models to reflect empowering leadership and its effect on stress, we consider the effect of empowering leadership-specific factors on perceived stress and cortisol as an open research question. However, assuming that the bifactor model will be validated, and given the generally positive effects associated with empowering leadership, we expect the empowering leadership global factor to be negatively associated with perceived stress and cortisol.

Hypothesis 3. The empowering leadership global factor will be negatively associated with perceived stress and cortisol.

2. Methods

2.1. Study Participants, Procedure, and Cortisol Level Measurement. Between January and May 2018, we conducted a cross-sectional study involving employees working in a French university hospital. Data were collected during the compulsory medical examination within the occupational health department. The participants were included by the physician, provided that they did not work at night and were not pregnant, after having given their written informed consent to participate. After completing the questionnaires, instructions for saliva self-sampling using a salivette (Sarstedt, Marnay, France) were given by a nurse to all participants. They were asked to (a) collect the sample between two working days, to ensure that the salivary cortisol level could reflect both recent occupational exposure and occupational exposure anticipation [24]; (b) avoid collecting the sample after an intense stressful event, to ensure that the salivary cortisol level reflected chronic occupational exposure and not an isolated event [24]; (c) in participants treated with corticosteroids, not to take treatment within 24 hours prior to sample collection [17, 18]; and finally (d) collect the sample in the morning, after awakening, and without toothbrushing, while fasting and without tobacco [17, 18]. Sampling was scheduled after awakening to accommodate the circadian rhythm of cortisol [16, 25].

Salivary cortisol levels were analysed by the physician of the occupational health department for medical control. Among all the participants with an elevated salivary cortisol level, none was diagnosed with Cushing's syndrome [26].

This study was ancillary to the Chrysalide research project [27], so there was no sample size determined specifically for this study. The sample collected ($n = 397$) was deemed sufficient to conduct structural equation modelling for the measurement model [28].

2.2. Salivary Cortisol Analyses. Free salivary cortisol level was assessed through a previously described "liquid chromatography-tandem mass spectrometry" (LC-MSMS) in-house method [29]. This method was chosen because of the specificity of its measurement [18]. Briefly, free salivary

cortisol was determined from 500 μL of the salivary sample, using a liquid-liquid extraction (LLE) with dichloromethane. High-performance liquid chromatography (HPLC) systems were from Agilent Technology (Agilent Technologies, Les Ulis, France) coupled with 3200 Qtrap spectrometers (Sciex, Les Ulis, France). The quantification transition used was $363 > 121$. The deuterium internal standard contained cortisol-d4. Cortisol standards for establishing calibration curves were diluted in methanol.

2.3. Psychometric Measures. Empowering leadership was measured using the Leader Empowering Behaviour Questionnaire (LEBQ; Supplementary Table S1) created by Konczak et al. [30]. The questionnaire consists of 17 items helping to measure six behaviors: accountability, delegation of authority, information sharing, self-directed decision-making, coaching for innovative performance, and finally skills development. The level of agreement with each statement was indicated on a seven-point scale, ranging from "strongly disagree" to "strongly agree." The LEBQ has been found to exhibit satisfactory criterion validity and reliability [30, 31].

Perceived stress was measured using the Perceived Stress Scale in its four-item version [32]. Participants were asked how often they had been faced with each situation during the last four weeks, on a five-point scale ranging from (1) "never" to (5) "often." The four-item version of the PSS has been previously found to exhibit satisfactory criterion validity and reliability [33].

2.4. Ethical Approval Statement. This work belongs to the Chrysalide research project [27]. The Nantes University Hospital Ethics Committee (i.e., GNEDS, Groupe Nantais d'Éthique dans le Domaine de la Santé) approved the research protocol (reference number GNEDS02122018). The entire methodology was conducted in line with the Declaration of Helsinki guidelines. The protocol is registered online under the reference number NCT04010773 (ClinicalTrials.gov).

2.5. Statistics

2.5.1. Test of the Bifactor Configuration of Empowering Leadership. We first tested the bifactor structure of empowering leadership using Mplus software, version 8.3. The models were assessed with the maximum likelihood of robust standard errors (MLR). The analysis strategy recommended by Morin et al. [23] was used. More precisely, four competing empowering leadership measurement models were estimated (Supplementary Figure S1 online): (1) the original six correlated factors model is proposed by Konczak et al. [30] using confirmatory factor analysis (CFA), in which the factors are strictly defined by their corresponding items; (2) the same six correlated factors configuration using exploratory structural equation model (ESEM), in which the items can contribute to multiple dimensions simultaneously as cross-loadings are considered

[23]; (3) a configuration using a bifactor CFA model (BCFA) with one global factor defined by the entire set of empowering leadership items and six specific factors defined by their respective items [23] (Factors were specified as independent (i.e., orthogonal) without cross-loadings, considering that the global factor accounts for the covariance between the dimensions [23]); and (4) the same configuration using a bifactor-ESEM model (BESEM), in which the items are allowed to contribute to the other specific factors, as well as to the global factor and their dedicated specific factor. The best factor configuration for measuring empowering leadership was then used to assess the complete measurement model integrating empowering leadership and perceived stress (defined based on a CFA model).

We then compared the models with each other, assessing the parameters and fit indices estimated within the models. The model fit was evaluated by utilizing the root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker–Lewis index (TLI). A CFI (or a TLI) equal to or exceeding 0.90 indicates an acceptable fit, while a value of 0.95 or higher indicates an excellent fit to the data [34]. Similarly, a RMSEA less than 0.08 is considered acceptable, and a value below 0.06 indicates an excellent fit [34]. The comparison begins with ESEM and CFA models. The ESEM model could be selected based on three criteria: (a) exhibiting the best-fit indices, (b) a decrease in interfactor correlations when accounting for cross-loadings, and (c) a correct definition of factors [34]. Second, a comparison was made between the chosen ESEM or CFA model and its respective bifactor model. One could select the bifactor model based on three criteria: (a) a correct definition of the global factor by the entire set of items, (b) a correct definition of the specific factors, and (c) the best-fit indices [23]. The composite reliability coefficient omega (ω) was also calculated for each factor.

2.5.2. Multiple Imputation Strategy. Of the 397 study participants, 110 did not provide their saliva sample (i.e., 28%). To take into account missing data, all the analyses exploring the relationships between empowering leadership, perceived stress, and salivary cortisol were performed using the multiple imputation method [35] using the factor scores (in their standardized form: mean = 0 and standard deviation = 1) extracted from the complete measurement model integrating empowering leadership and perceived stress. The 4.1.0 version of the R software was used to perform analyses with the “mice” package [35]. More precisely, 20 datasets were created by imputing the salivary cortisol level each time using a stochastic regression [35]. Then, the graphical appearance of the 20 imputed distributions of the salivary cortisol level was compared with that of the observed distribution of the salivary cortisol level to verify their similarity and the absence of aberrant imputations (e.g., negative values [35]). Finally, combined regression analyses were performed on the imputed 20 datasets according to the strategy described below.

2.5.3. Relationship between Empowering Leadership, Perceived Stress, and Salivary Cortisol Level. We assessed a series of models to investigate the effect of empowering leadership (a) on perceived stress and (b) on salivary cortisol, (c) the mediating effect of perceived stress on the relationship between empowering leadership and salivary cortisol, and (d) the moderating effect of empowering leadership on the relationship between perceived stress and salivary cortisol. First, two explanatory perceived stress models were assessed: Mps0, with the control variables only, and Mps1, with the addition of the six specific factors and the global factor for empowering leadership as explanatory variables. Mps1 allowed investigation of the effect of empowering leadership on perceived stress. The comparison of the R^2 of Mps1 and Mps0 showed the share of perceived stress variance explained by empowering leadership, independently of the control variables. Then, we assessed a series of explanatory models for salivary cortisol: Mc0 with the control variables only, Mc1 with perceived stress, Mc2 with the specific factors and the global factor for empowering leadership, Mc3 with perceived stress, the six specific factors and the global factor for empowering leadership, and Mc4, using the same specifications as for Mc3, with the interaction between perceived stress and the specific factors, as well as the global factor for empowering leadership. Mc1 showed the effect of perceived stress on salivary cortisol. Mc2 showed the effect of empowering leadership on salivary cortisol. Mc3 showed the relative contribution of perceived stress and empowering leadership in explaining salivary cortisol. Finally, Mc4 showed the interaction between empowering leadership and perceived stress to explain salivary cortisol. The comparison of the R^2 of Mc1 and Mc2 with the R^2 of Mc0 showed the share of salivary cortisol variance explained, respectively, by perceived stress and empowering leadership, independently of the control variables.

All models assessed with multiple imputations were adjusted for the controlled variables (i.e., gender, age, occupation, working time, and length of service in the organization). Fourteen participants reported being treated with corticosteroids (3 oral, 6 dermal, and 5 nasal). Therefore, the explanatory models for salivary cortisol were also adjusted for the intake of corticosteroids. A significance threshold of 5% for the risk of error α was applied when testing the hypotheses.

Considering recent developments in statistics, the mediating effect of perceived stress was directly tested using the bootstrapping method [36] combined with multiple imputation analyses [37]. These analyses were performed using *bememLavaan* package with R [38]. The method involves drawing B bootstrap samples from the original data and then generating K multiple imputations nested within each of the B bootstrap samples. The mediation effect is estimated in each of the $K * B$ subsamples, giving the distribution of the mediation effect and allowing 95% confidence intervals to be constructed (for details, refer to [37]). According to the recommendations, we performed 1000 bootstrap samples with 20 multiple imputations each [35, 37].

3. Results

3.1. Participants. The sociodemographic variables and salivary cortisol, perceived stress, and empowering leadership before modelling are described in Supplementary Table S2 online. A sample of 397 participants was included. The mean age was 40.37 ± 10.57 years (range: 19–69 years), and the mean service length in the organization was 13.71 ± 9.81 years. About 80% of participants were women. The most represented occupations were nurses, nurse assistants, and physicians, accounting for 36.3%, 22.2%, and 21.9% of the sample, respectively. Most participants worked full time (71.5%). The mean total empowering leadership score was 4.61 ± 0.95 (range: 1–7), indicating that overall, the participants perceived that their manager was engaged in empowering leadership behaviors. The mean perceived stress score was 6.16 ± 3.25 (range: 0–16), close to that observed in the broader French workforce [39]. The mean salivary cortisol level was 2.84 ± 1.60 ng/mL (range: 0.24–13.50 ng/mL).

3.2. Fit of the Measurement Models for Empowering Leadership. Table 1 displays the fit indices of the measurement models. The residual item variance (δ), the standardized item factor loadings (λ), and the dimension reliability are shown in Supplementary Table S3 online. Supplementary Table S4, available online, presents the correlations between the factors within both the ESEM and CFA models. There was an overall satisfactory fitting for the four empowering leadership measurement models, except for the CFA configuration, with a TLI of 0.889. The best fit to the data for all the indices was obtained with the BESEM model.

3.3. ESEM versus CFA Models. The ESEM model exhibited a better fit compared to the CFA one. Both in the ESEM and CFA models, the dimensions for empowering leadership were well-defined by their devoted items ($\lambda = 0.289$ – 0.949 and $\lambda = 0.360$ – 0.902 , respectively). Regarding the ESEM configuration, many cross-loadings could be observed and were found to remain lower than the loading coefficients observed for the devoted items ($\lambda = 0.003$ – 0.287). Finally, relative to the CFA model, the ESEM model exhibited a decrease in the interfactor correlations. In sum, the ESEM configuration could be considered the best model.

3.4. ESEM versus BESEM Models. The BESEM model was overall well-defined. Except for item 6 relating to accountability ($\lambda = 0.053$), all empowering leadership items showed high and significant loading coefficients for the global factor ($\lambda = 0.357$ – 0.735). The specific factors were found to be correctly defined by their devoted items ($\lambda = 0.073$ – 0.708). However, item 7 showed a non-significant and very low loading coefficient in defining its specific factor (i.e., self-directed decision-making). Nonetheless, the other dedicated items correctly defined the self-directed decision-making dimension ($\lambda = 0.592$ – 0.595).

The other specific factors for empowering leadership were also well-defined. In summary, the BESEM model exhibited the best fit, with the global and specific factors being correctly defined. Therefore, the BESEM model was retained as the best model for measuring empowering leadership in further analyses.

3.5. Perceived Stress and Empowering Leadership Measurement Model. The final measurement model, combining the BESEM model for measuring empowering leadership and perceived stress, was well-defined (Table 2) and showed an excellent fit for all the indices (Table 1).

3.6. SC Level Imputation. The distributions of the salivary cortisol level in the 20 imputed databases, as well as the observed distribution of the salivary cortisol level, are shown in Supplementary Figure S2 online. The appearance of the imputed distributions was similar to that of the observed distribution, without outliers.

3.7. Empowering Leadership and Perceived Stress. Table 3 presents the Msp0 and Msp1 models for perceived stress. As expected, the global factor for empowering leadership is negatively correlated with perceived stress, thereby confirming Hypothesis 3. However, the specific factors for coaching for innovative performance, information sharing, and self-directed decision-making were surprisingly positively associated with perceived stress. Empowering leadership accounted for 13.3% of perceived stress. Further analyses revealed a percentage of perceived stress equivalents for the global factor and the specific factors for empowering leadership grouped together, ranging between 5.7% and 7.1% (Supplementary Table S5).

3.8. Empowering Leadership, Perceived Stress, and Salivary Cortisol. The models for salivary cortisol are presented in Table 4. A positive correlation was observed between salivary cortisol and perceived stress. Conversely, the global factor for empowering leadership is negatively correlated with salivary cortisol, thereby confirming Hypothesis 3. Unexpectedly, there was also a negative correlation between the specific factor for accountability and salivary cortisol. The comparison of Mc2 with Mc0 revealed that empowering leadership significantly explained 9.8% of the change in salivary cortisol, an explained variance level significantly higher by 8.3% compared to that of perceived stress (comparison of the R^2 of the Mc1 and Mc2 models). Therefore, at this stage, empowering leadership could be considered a stronger predictor of salivary cortisol level after awakening than perceived stress.

Bootstrapping analyses combined with multiple imputations for the test of the mediating effect of perceived stress were not significant (Supplementary Table S6). Therefore, we could not conclude that perceived stress mediated the relationship between empowering leadership and salivary cortisol. Consequently, Hypothesis 1 is rejected.

TABLE 1: Results of the fit analysis of the measurement models.

	χ^2 (df)	CFI	TLI	RMSEA	90% CI
Alternative models of empowering leadership					
CFA	316.244 (104)*	0.915	0.889	0.072	[0.063; 0.081]
BCFA	249.763 (102)*	0.941	0.922	0.060	[0.051; 0.070]
ESEM	79.874 (49)*	0.988	0.966	0.040	[0.023; 0.055]
BESEM	51.744 (38)*	0.995	0.980	0.030	[0.000; 0.049]
Measurement model for measuring empowering leadership (BESEM) and perceived stress (CFA)					
	174.937 (101)*	0.997	0.952	0.043	[0.032; 0.053]

Note. * $p < 0.01$; ESEM = exploratory structural equation modelling; BESEM = bifactor-ESEM; CFA = confirmatory factor analysis; BCFA = bifactor CFA; χ^2 = K χ^2 test; df = degree of freedom; RMSEA = root mean square error of approximation; TLI = Tucker-Lewis index; CFI = comparative fit index; 90% CI = 90% confidence interval for the RMSEA.

TABLE 2: Standardized parameter estimates (loadings λ ; residuals δ) for measuring empowering leadership (BESEM) and perceived stress (CFA).

Items	BESEM of EL							CFA of PS		
	GF- λ	SF- λ	SF- λ	SF- λ	SF- λ	SF- λ	SF- λ	δ	λ	δ
Delegation of authority										
Item 1	0.698	0.555	<i>-0.011</i>	<i>0.019</i>	<i>-0.020</i>	<i>0.004</i>	<i>0.013</i>	0.204		
Item 2	0.696	0.626	<i>0.028</i>	<i>0.034</i>	<i>0.024</i>	<i>-0.013</i>	<i>-0.001</i>	0.121		
Item 3	0.673	0.224	0.245	<i>-0.040</i>	<i>0.022</i>	<i>-0.061</i>	<i>0.134</i>	0.413		
ω		0.728								
Accountability										
Item 4	0.495	0.145	0.614	<i>0.108</i>	<i>0.087</i>	<i>-0.033</i>	<i>0.073</i>	0.331		
Item 5	0.377	<i>0.003</i>	0.667	<i>0.004</i>	<i>-0.129</i>	<i>-0.043</i>	<i>-0.152</i>	0.372		
Item 6	0.060	<i>-0.057</i>	0.437	0.253	<i>0.066</i>	<i>-0.006</i>	<i>-0.088</i>	0.726		
ω			0.674							
Self-directed decision-making										
Item 7	0.747	<i>-0.085</i>	<i>-0.063</i>	0.063	<i>-0.134</i>	<i>-0.156</i>	<i>-0.133</i>	0.367		
Item 8	0.361	0.133	0.273	0.603	<i>-0.023</i>	<i>-0.062</i>	<i>-0.010</i>	0.409		
Item 9	0.626	<i>-0.090</i>	<i>0.032</i>	0.577	<i>-0.001</i>	<i>-0.001</i>	<i>0.012</i>	0.265		
ω				0.597						
Information sharing										
Item 10	0.721	<i>0.050</i>	<i>0.020</i>	<i>0.017</i>	0.419	0.105	<i>-0.002</i>	0.291		
Item 11	0.689	<i>-0.022</i>	<i>-0.021</i>	<i>-0.051</i>	0.580	<i>0.071</i>	<i>-0.060</i>	0.178		
ω					0.680					
Skills development										
Item 12	0.505	<i>-0.124</i>	<i>-0.030</i>	0.141	<i>0.101</i>	0.158	<i>-0.020</i>	0.673		
Item 13	0.653	<i>-0.004</i>	<i>-0.059</i>	<i>-0.032</i>	<i>0.030</i>	0.659	<i>-0.004</i>	0.134		
Item 14	0.570	<i>0.006</i>	<i>-0.017</i>	<i>-0.105</i>	<i>0.106</i>	0.464	0.138	<i>0.418</i>		
ω						0.573				
Coaching for innovative performance										
Item 15	0.568	0.083	<i>-0.134</i>	<i>0.016</i>	<i>-0.117</i>	<i>0.068</i>	0.414	0.462		
Item 16	0.677	<i>0.041</i>	<i>-0.053</i>	<i>0.046</i>	<i>0.042</i>	<i>0.135</i>	0.303	0.423		
Item 17	0.724	<i>-0.043</i>	<i>-0.101</i>	<i>-0.122</i>	<i>0.000</i>	<i>-0.048</i>	0.230	0.394		
ω	0.940						0.412			
Perceived stress										
Item 1									0.782	0.389
Item 2									0.735	0.460
Item 3									0.713	0.492
Item 4									0.756	0.429
ω									0.834	

Note. PS = perceived stress; EL = empowering leadership; BESEM = bifactor exploratory structural equation modelling; CFA = confirmatory factor analysis; SF = specific factor estimated as part of a bifactor model; GF = global factor estimated as part of the bifactor model; ω = omega coefficient of model-based composite reliability; δ = item uniqueness; λ = factor loading. Target BESEM factor loadings are indicated in bold; nonsignificant parameters ($p > 0.05$) are shown in italic.

However, supporting Hypothesis 2, salivary cortisol could be explained by a significant interaction effect between perceived stress and the specific factor for accountability and

the global factor for empowering leadership. The two interaction effects are presented graphically in Figure 1. It revealed that the positive relationship between perceived

TABLE 3: Hierarchical linear model for measuring perceived stress.

	Mps0			Mps1		
	<i>b</i>	<i>s.e.</i>	<i>p</i>	<i>b</i>	<i>s.e.</i>	<i>p</i>
Intercept	-0.01	0.27	0.983	0.14	0.26	0.589
Male versus						
Female	0.02	0.14	0.894	0.03	0.13	0.815
Age	0.01	0.01	0.186	0.00	0.01	0.527
Position N-assistants versus						
HSW	-0.19	0.27	0.478	-0.12	0.26	0.639
Others	-0.45	0.26	0.082	-0.49	0.25	0.050
Nurse managers	-0.47	0.24	0.050	-0.39	0.23	0.086
Head physicians	-0.29	0.43	0.505	-0.11	0.41	0.784
Nurses	-0.17	0.12	0.184	-0.21	0.12	0.087
Physicians	-0.10	0.15	0.538	-0.19	0.15	0.212
Secretaries	0.03	0.21	0.879	0.01	0.20	0.953
Working full time versus						
Part-time	-0.19	0.11	0.079	-0.16	0.10	0.123
Seniority	-0.01	0.01	0.052	-0.01	0.01	0.165
GF for EL				-0.27	0.05	0.000
SF for dele.				-0.03	0.05	0.595
SF for Acc.				0.00	0.05	0.996
SF for self.				0.17	0.05	0.002
SF for info.				0.13	0.05	0.017
SF for skills.				0.04	0.05	0.424
SF for innov.				0.31	0.07	0.000
R^2			0.039			0.172
ΔR^2						0.133

Note. Significant parameters are indicated in bold ($p \leq 0.05$); *b* = nonstandardized regression coefficient; *s.e.* = standard error of the coefficient; *p* = *p* value; N-assistants = nursing assistants; R^2 = percentage of variance explained; ΔR^2 = difference in variance explained; EL = empowering leadership; Innov. = coaching for innovative performance; Skills. = skills development; Info. = information sharing; Self. = self-directed decision-making; Acc. = accountability; Dele. = delegation of authority; GF = global factor; SF = specific factor; HSW = hospital service workers.

stress and salivary cortisol decreased as the specific factor for accountability and the global factor for empowering leadership increased, to the extent that when the levels of the specific factor for accountability and global factor for empowering leadership were the highest, perceived stress was no longer related to high salivary cortisol levels.

4. Discussion

4.1. Bifactor Model for Measuring Empowering Leadership. These findings unequivocally highlighted the superiority of the bifactor model in capturing empowering leadership, thus supporting the simultaneous manifestation of global and specific phenomena within empowering leadership. On the one hand, the identification of the specific factors supported the specific phenomenon, which involves the independent implementation of the behaviors of coaching for innovative performance, skills development, information sharing, self-directed decision-making, accountability, and delegation of authority. On the other hand, the identification of the global factor supported the global phenomenon, which involves the implementation of a set of empowering leadership behaviors. By extension, these findings suggest that managers can selectively exhibit each of the specific empowering leadership behaviors and adopt all empowering leadership behaviors.

Finding a global factor aligns with existing literature. In fact, the most recent scales for measuring empowering leadership propose the combination of various behaviors into overarching factors (e.g., the two-dimensional scale proposed by Amundsen and Martinsen [4]). Nevertheless, the identification of the specific factors along with the global factor raised questions about the limits of the parsimonious operationalization of empowering leadership. Indeed, it could be assumed that they did not allow to take into account the specific nature of certain practices and their outcomes.

4.2. Empowering Leadership and Perceived Stress. As expected, the bifactor analysis confirms the contrasting effects of empowering leadership on perceived stress suggested in the literature [12]. We showed that all the empowering leadership behaviors (i.e., the global factor) contributed to decrease perceived stress. This result suggests that empowering leadership functions as an occupational resource that can enhance employees' perceived ability to cope with job demands [40]. This aligns with recent studies on the topic, including those conducted by Kim and Beehr [20] as well as Tripathi and Bharadwaja [11]. However, when the effect of the global factor was taken into account, some specific factors were positively associated with perceived stress. This result confirmed that some empowering

TABLE 4: Hierarchical linear model for assessing the cortisol level (combined analysis of 20 imputed data sets).

	Mc0			Mc1			Mc2			Mc3			Mc4		
	<i>b</i>	<i>s.e.</i>	<i>p</i>	<i>b</i>	<i>s.e.</i>	<i>p</i>	<i>b</i>	<i>s.e.</i>	<i>p</i>	<i>b</i>	<i>s.e.</i>	<i>p</i>	<i>b</i>	<i>s.e.</i>	<i>p</i>
Intercept	1.89	0.67	0.006	1.88	0.67	0.006	2.22	0.64	0.001	2.20	0.64	0.001	2.13	0.64	0.001
Male versus															
Female	0.11	0.31	0.737	0.10	0.31	0.746	0.04	0.31	0.894	0.04	0.30	0.908	0.11	0.30	0.714
Age	-0.02	0.01	0.197	-0.02	0.01	0.148	-0.02	0.01	0.094	-0.02	0.01	0.082	-0.02	0.01	0.066
C-therapy															
NA versus															
Yes	0.42	0.65	0.515	0.46	0.65	0.476	0.04	0.63	0.949	0.04	0.63	0.944	0.21	0.62	0.735
No	0.60	0.45	0.191	0.61	0.45	0.179	0.31	0.44	0.483	0.30	0.43	0.488	0.35	0.43	0.423
Position															
N-assistants versus															
HSW	-0.05	0.57	0.937	0.00	0.56	0.995	0.02	0.55	0.977	0.04	0.55	0.945	-0.03	0.55	0.960
Others	0.58	0.53	0.271	0.68	0.53	0.202	0.64	0.52	0.222	0.73	0.53	0.170	0.75	0.52	0.154
Nurse managers	0.51	0.44	0.257	0.60	0.44	0.176	0.80	0.43	0.064	0.87	0.43	0.045	0.87	0.43	0.043
Head physicians	1.81	0.89	0.043	1.87	0.88	0.035	2.07	0.86	0.018	2.09	0.86	0.016	2.27	0.87	0.010
Nurses	-0.01	0.23	0.982	0.03	0.22	0.892	0.23	0.22	0.294	0.27	0.22	0.224	0.22	0.22	0.323
Physicians	0.81	0.32	0.013	0.83	0.32	0.011	0.93	0.32	0.005	0.97	0.32	0.003	0.98	0.32	0.003
Secretaries	0.52	0.39	0.177	0.52	0.38	0.179	0.77	0.39	0.049	0.76	0.38	0.048	0.72	0.38	0.059
Working full time versus															
Part-time	0.30	0.20	0.141	0.34	0.20	0.094	0.28	0.20	0.162	0.30	0.20	0.124	0.31	0.20	0.119
Seniority	0.04	0.01	0.001	0.05	0.01	0.001	0.05	0.01	0.001	0.05	0.01	0.000	0.05	0.01	0.000
GF for EL							-0.25	0.10	0.011	-0.20	0.10	0.040	-0.17	0.10	0.093
SF for dele.							-0.08	0.10	0.442	-0.07	0.10	0.471	-0.10	0.10	0.317
SF for acc.							-0.40	0.12	0.001	-0.40	0.12	0.001	-0.29	0.13	0.026
SF for self.							-0.18	0.11	0.094	-0.21	0.11	0.054	-0.20	0.11	0.081
SF for info.							-0.08	0.11	0.468	-0.10	0.11	0.350	-0.08	0.11	0.447
SF for skills.							0.18	0.10	0.075	0.18	0.10	0.085	0.17	0.10	0.103
SF for innov.							0.02	0.16	0.907	-0.04	0.16	0.824	0.02	0.16	0.925
PS				0.21	0.10	0.028				0.18	0.10	0.079	0.13	0.10	0.185
PS × GF for EL													-0.18	0.09	0.039
PS × SF for dele.													-0.01	0.10	0.952
PS × SF for acc.													-0.22	0.09	0.021
PS × SF for self.													-0.10	0.10	0.355
PS × SF for info.													0.01	0.10	0.945
PS × SF for skills.													0.04	0.12	0.751
PS × SF for innov.													0.01	0.15	0.924
R^2			0.103			0.118			0.201			0.210			0.251
ΔR^2 with Mc0						0.015			0.098			0.107			0.148
ΔR^2 with the previous model						0.015			0.083			0.009			0.041

Note. Significant parameters are indicated in bold ($p \leq 0.05$); b = nonstandardized regression coefficient; $s.e.$ = standard error of the coefficient; p = p value; C-therapy = corticosteroid therapy; N-assistants = nursing assistants; HSW = hospital service workers; EL = empowering leadership; Innov. = coaching for innovative performance; Skills. = skills development; Info. = information sharing; Self. = self-directed decision-making; Acc. = accountability; Dele. = delegation of authority; SF = specific factor; GF = global factor; PS = perceived stress; R^2 = percentage of variance explained; ΔR^2 = difference in variance explained. All estimated parameters were obtained from the combined analysis of 20 imputed data sets.

leadership behaviors might also pose a stress-inducing demand for employees [40], as proposed by Cheong et al. [12].

First, the positive effect of the specific factor for self-directed decision-making indicated that fostering autonomy and the expectation of autonomy expressed by the manager in the decision-making could be a factor for perceived stress. This finding is aligned with the assumption of Cheong et al. [12], according to which empowering leadership-induced autonomy could be a stressing demand. Furthermore, it is consistent with the mixed effect of autonomy reported in the literature. While it is predominantly viewed as a resource

[40], job autonomy is also demanding for employees, as they are required to independently make decisions with regard, for instance, to the work procedure or method [13].

Similarly, the specific factor for coaching for innovative performance was positively related to perceived stress. This could be explained by the fact that encouraging innovation could be demanding [40] for the employees. Indeed, the manager's incentive to propose new ideas implies an effort by the employees to identify problems, to search and encode information, to generate new ideas, and to express them publicly [7]. Therefore, it seems reasonable to consider that the manager's encouragement to innovate in empowering

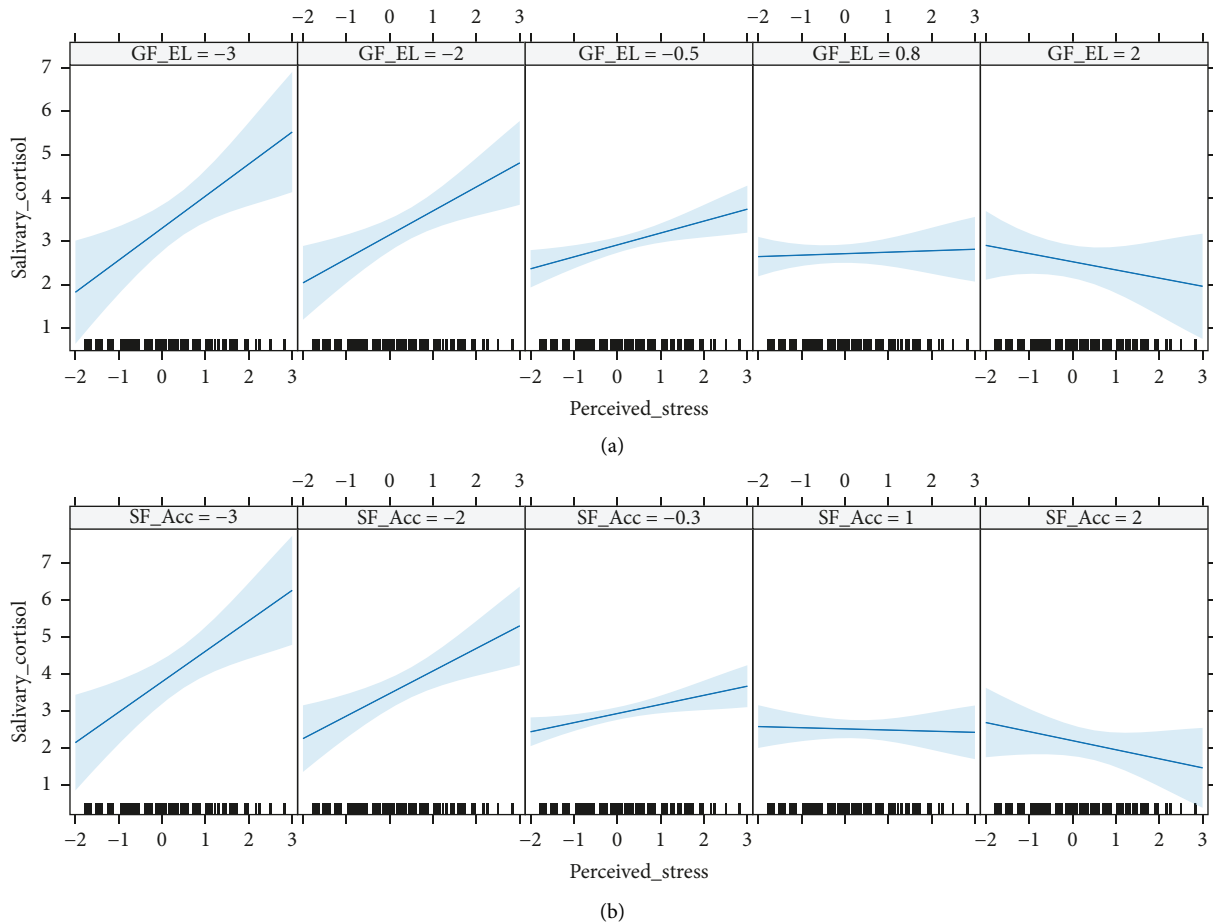


FIGURE 1: Moderating effect of empowering leadership in the analysis of the relationship between perceived stress and salivary cortisol. (a) Moderating effect of the global factor for empowering leadership. (b) Moderating effect of the specific factor for accountability. Note. GF EL = empowering leadership global factor; SF Acc = accountability specific factor.

leadership could be demanding for the employees and could, therefore, reduce their resources and generate perceived stress [40].

Finally, the positive association between the specific factor for information sharing and perceived stress indicated that access to information could also be a job demand. In this sense, some studies have shown that the increase in available information may exceed the processing capacities of individuals and lead to a relative experience of information overload and perceived stress [41]. The overload would be observed in particular when the information available is useful [41]. The perceived usefulness would push individuals to consider the information with a potential risk of exceeding their cognitive abilities and experiencing stress [41]. This mechanism could explain the contrasting effect we observed. Once the positive effect of information sharing is taken into account through the effect of the global factor, the sharing of “additional” information could be a factor leading to information overload and thus to perceived stress, characterized by the positive effect of the specific factor for information sharing on perceived stress.

More generally, we could assume that an imbalance mechanism in the implementation of empowering leadership behaviors could also be considered to understand the

negative effect of the specific factors [42]. Indeed, it should be noted that the specific factors should be considered as deviations from the global factor for empowering leadership [23]. In other words, we could assume that the global factor reflects the combined implementation of the entire set of empowering leadership behaviors, while the specific factors reflect the isolated implementation of these behaviors. Following this reasoning, the negative effect of the global factor on perceived stress could indicate the protective effect of the combination of the whole set of empowering leadership behaviors, while the positive effect of the specific factors on perceived stress could reflect the demanding effect associated with the isolated implementation of these behaviors. In this sense, the literature widely indicates that the effect of job demands on stress is likely to be moderated by job resources [40]. Using this reasoning, we could assume that the combined implementation of all the empowering leadership behaviors (i.e., the global factor) is likely to moderate the negative effects of information sharing and incentives for autonomy and innovation. Indeed, we can suppose that combining information sharing and incentives for autonomous decision-making and innovation on the one hand, with power sharing, accountability, and skill development on the other hand, could give employees the power

and skills they need to cope effectively with the demands of autonomous decision-making, innovation, and information processing and thus reduce perceived stress. Conversely, the selective implementation of these behaviors could induce perceived stress through the mechanisms suggested in the previous paragraphs. Nevertheless, further person-centered research (e.g., latent profile analyses) is needed to confirm this assumption [42].

4.3. Empowering Leadership and Salivary Cortisol. Nevertheless, the contrasting effect of empowering leadership seemed limited to the field of perception. Indeed, our results clearly indicated a negative effect of empowering leadership on salivary cortisol. Therefore, our study confirmed the protective effect of empowering leadership against employees' stress. Moreover, with almost 10% of variance explained, empowering leadership was a better predictor of salivary cortisol than perceived stress (1.5%). Thus, the measurement of the employees' resources, and in particular empowering leadership, could be preferred to estimate the impact of the psychosocial environment on their biological health [43, 44].

To understand this effect on salivary cortisol, we tested two alternative models: a perceived stress-mediated empowering leadership model, and a perceived stress-empowering leadership interaction model. Only the interaction model was validated. To put it differently, the protective effect of empowering leadership against elevated salivary cortisol could be better explained by the improved capability of employees to manage perceived stress, rather than by the reduction in perceived stress. In this sense, the transactional model of stress that measures perceived stress at a time t could not affect health at a time $t+2$ if the strategies implemented in the meantime (i.e., at $t+1$) have allowed regulating the environmental threat and reducing perceived stress [21]. To this end, strategies centered on stress factor regulation generally show a significant efficiency [45]. However, implementing these strategies assumes that the individuals have a sufficient level of resources [43], particularly in terms of control over their environment [22]. Considering the effect of empowering leadership on empowerment and the development of new resources, we could assume that empowering leadership gives employees the resources necessary for their behavioral commitment in the regulation of environmental demands to cope with perceived stress and thus contributes to reduce salivary cortisol.

Besides the effect of the global factor for empowering leadership, we observed that the specific factor for accountability was negatively associated with salivary cortisol. This result is particularly original since the literature suggests on the contrary that accountability could have the effect of a stressful occupational demand [12]. Moreover, the explanatory power of the specific factor for accountability ($b = -0.405$) was significantly higher than that of the global factor for empowering leadership ($b = -0.246$), suggesting that the employees' accountability could be the most protective aspect of empowering leadership against biological stress.

Laboratory studies have shown that the threats of social esteem or identity loss would be a powerful predictor of the activation of the biological response to stress [19]. To address these situations, individuals with high self-esteem tend to lack self-esteem less when faced with a threat to their social identity (e.g., social rejection) and, in turn, to experience a lesser increase in cortisol level [46]. According to us, accountability promoted by the manager could increase self-esteem, by encouraging employees to personally appropriate the results of their work. In this sense, the literature indicates that some forms of support, consisting of indicating to the employees their skills and value for the organization, could have a direct positive effect on self-esteem [47]. This positive effect of accountability on self-esteem could, in turn, reduce the employees' propensity to lack self-esteem, especially when faced with situations likely to threaten their social identity (e.g., observation of their work by others [19]), and thus decrease the activation level of the biological mechanisms of the stress response [46]. Moreover, as a personal resource [40], the self-esteem induced by accountability could also promote the employees' commitment to the regulation of perceived stress [43] and thus reduce the impact of perceived stress on biological stress.

4.4. Limitations. Considering that the cultural and organizational contexts can modify the effect of empowering leadership [1], these findings should be replicated in other samples. Furthermore, the cross-sectional design of the study might be biased. An experimental study assessing the effect of different empowering leadership behaviors on several measurements of salivary cortisol upon awakening could provide a stronger level of evidence of the effect of empowering leadership on biological stress [16].

5. Conclusions

We can conclude that empowering leadership is an ambiguous predictor of perceived stress, likely to both decrease it but also increase it if specific factors are taken into account. In this regard, these findings underscore the importance of embracing all empowering leadership behaviors to yield positive impacts on stress perception. On the other hand, empowering leadership shows clear protective effect against the increase in salivary cortisol. Although these results need to be confirmed, they suggest that empowering leadership behaviors could prevent biological stress [16].

6. Implications for Nursing Management

This study supports the need to implement empowering leadership in organizations and to prevent employee's stress. However, it invites to combine all empowering leadership behaviors to favor protective effects on perceived stress. Specifically, before sharing information and inviting employees to be innovative and autonomous, managers should be willing to recognize responsibility, provide support, and share power. On the flip side, managing through incentives for autonomy and innovation or information sharing, without recognizing employees' responsibility, supporting,

and sharing power, might contribute to perceived stress. Therefore, this study calls for future interventions designed to encourage the implementation of the full set of empowering leadership behaviors.

Data Availability

The dataset collected in the study will be available from the corresponding author upon reasonable request three years after the end of the study.

Disclosure

This study was conducted as part of the Chrysalide research project [27]. The ministry of health and the Nantes University Hospital have no role in the definition of the protocol, the conduct of the study, the data collection, the processing and interpretation of the data, nor in the choice of the results to present or the modes of valorization chosen.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

The study was designed by BC and JG. BC and JG assumed the roles of principal investigator and study coordinator, respectively. BC, under the supervision of NG (psychology coordinator), formulated the psychometric indicators and outlined the psychosocial objectives of the research. Under the supervision of KB (biology coordinator) and DT (medicine coordinator), JL articulated the biological indicator and formulated the biological objectives. The design of the study methodology was coordinated by DT, KB, GFB, and LM. Under the supervision of PC and NG, the statistical analysis was performed by BC. All authors, including IG, EF, AP, AA, FO, KB, PC, NG, and DT, proposed changes and contributed to the drafting of the present manuscript produced by BC. The manuscript was read and approved by all authors.

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Supplementary Materials

Supplementary Figure S1: alternative models for measuring empowering leadership. Supplementary Figure S2: distributions of the imputed (red) and observed (blue) cortisol levels. Supplementary Table S1: Leader Empowering Behavior Questionnaire (LEBQ). Supplementary Table S2: sample characteristics. Supplementary Table S3: standardized parameter estimates (loadings λ ; residuals δ) for the CFA, BCFA, ESEM, and BESEM models for measuring empowering leadership. Supplementary Table S4: correlations between the latent factors in the CFA and ESEM models. Supplementary Table S5: the hierarchical linear model of perceived stress: distinction between the global factor and the specific factors for empowering leadership. Supplementary Table S6: bootstrapping analyses combined with multiple imputations for the test of the mediating effect of perceived stress. (*Supplementary Materials*)

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Research Article

Resilience and Flexibility for Clinical Nurses: A Latent Class Analysis

Shuang Zhao ¹, Zeyu Zhang ¹, Xiaocui Duan,¹ Yujiao Shao,¹ Fuzhi Wang,² Yongxia Chen,³ Congyan Yang,³ Lingling Chen,⁴ Fei Wang,⁵ Jiaoping Zhang,⁶ Hailing Zhang,⁷ Xiumu Yang ^{1,8} and Changjiang Yuan ⁶

¹School of Nursing, Bengbu Medical University, Bengbu, Anhui, China

²School of Health Management, Bengbu Medical University, Bengbu, Anhui, China

³The First Affiliated Hospital of Bengbu Medical University, Bengbu, Anhui, China

⁴The Second Affiliated Hospital of Bengbu Medical University, Bengbu, Anhui, China

⁵Bengbu Third People's Hospital of Bengbu Medical University, Bengbu, Anhui, China

⁶Bengbu First People's Hospital, Bengbu, Anhui, China

⁷The First Affiliated Hospital of University of Science and Technology of China, Hefei, Anhui, China

⁸General Practice Education and Development Center, Bengbu Medical University, Bengbu, Anhui, China

Correspondence should be addressed to Xiumu Yang; 0700013@bbmc.edu.cn and Changjiang Yuan; 1284852122@qq.com

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Aim. To explore potential resilience and psychological flexibility patterns in nurses and analyze the effects of related factors such as growth mindset and professional recognition of categories. **Background.** Resilience and psychological flexibility can help nurses resist occupational pressure and play essential roles in promoting personal growth and professional development. **Methods.** A latent category approach was used to examine the patterns of heterogeneity in resilience and flexibility among 805 nurses. Differences in the influences related to resilience and flexibility were analyzed using univariate and multivariate logistic regressions, with demographic information, growth mindset, and career recognition as covariates. **Results.** Participants were divided into three potential categories: toughness-flexible (32.8%), power-deficit-emotional (23.1%), and toughness-rigid (44.1%). The results of multivariate logistic regression analysis showed that monthly income, mode of employment, growth mindset, and professional identity were influential factors in the potential categories of nurse resilience and flexibility. **Conclusion.** One cohort of nurses had high resilience and low flexibility, and psychological rigidity was related to the fact that the monthly income was less than RMB 5,000 and the contractual mode of employment. An excellent growth mindset and a high professional identity indicate that nurses are resilient and flexible. **Implications for Nursing Management.** Hospitals and nursing managers should pay attention to nurses' different career development needs and implement appropriate safeguards.

1. Introduction

There is no single definition of resilience or mental flexibility. An extensive review of the empirical literature summarizes resilience into five themes: overcoming adversity, adaptation and adjustment, prevalence, good mental health, and positive personal responses to challenges [1]. Psychological flexibility is the management of actions in a way that facilitates the pursuit of one's goals or values as

appropriate to the situation's needs [2]. In resilient shield theory [3], several indicators are interwoven to form a protective shield to help people withstand adversity. This clearly explains the theoretical system developed by many factors and flexibilities, in which the flexibility of the thinking layer allows for the transformation of cognition. Overall, resilience positively correlated with coping. Psychological flexibility, in contrast, is accompanied by goal orientation and action management. Both resilience and

flexibility in terms of favorable outcomes mean beating the odds, but there may be differences in the process involved and the result of the choices made.

The nursing community is a high-pressure occupational group, and nurses' mental health in China and other countries has received particular attention [4]. Work pressure, burnout, moral dilemmas, and vicarious trauma often lead to anxiety, depression, and other negative psychological aspects of this group [5–7], thus, laying hidden dangers to the quality of nursing services and even casting doubt on the value of the nursing profession [8]. When nurses face stress and challenges over time, better resilience helps them cope and adapt to adversity. However, psychological flexibility serves as a guiding light, telling the nurse the direction or goal for which they should strive. Better resilience and flexibility with greater adaptability positively impacted nurses' psychological, physical, and occupational functioning.

Resilience is dynamically variable and multifactorial from resource-, outcome-, and process-based perspectives [9]. The process of coping with stress and challenges reflects the underlying characteristics of individuals. Although many studies have demonstrated a significant positive correlation between resilience and psychological flexibility, it is unknown whether more resilient individuals possess better psychological flexibility. Latent class analysis can categorize the study population based on probability, significantly differentiating between groups and allowing heterogeneous individuals to exhibit characteristics that differ from other categories [10]. This is an excellent approach for exploring differences in resilience and flexibility within the same group of nurses. Compared to clustering algorithms, latent class analysis reduces human-induced errors and can be used to test more complex variable relationships. Therefore, this study aimed to explore resilience and psychological flexibility patterns among clinical nurses.

The second aim was to elucidate the factors influencing nurses' resilience and psychological flexibility. The growth mindset theory hypothesizes that belief in changing our intellect and mindset can influence how we handle challenges and define goals [11]. The motivation involved involves a complex interaction between goal orientation and mindset and has a wide range of applications in education. Michael reviewed 27 medical professional education articles on growth mindset. He noted that one of its potential benefits is that it provides people with emotional and psychological support, increased resilience, improved mental health, and self-confidence [12]. Professional identity is a positive perception and evaluation of the occupation in which you work [13]. Affirmation of the profession likewise affects the psychological state of the nurses themselves, their personal career development, quality nursing care, and the advancement of the professional discipline [14]. Nurses' resilience is significantly associated with their professional identity [15]. Higher resilience corresponds to a more positive career perception [16]. Figure 1 illustrates this study's portfolio framework.

Therefore, we propose the following hypotheses: (a) there is heterogeneity in patterns of resilience and psychological flexibility among clinical nurses, (b) a growth

mindset can influence nurses' patterns of resilience and psychological flexibility, and (c) professional identity can influence nurses' patterns of resilience and psychological flexibility. Exploring models of nurse resilience, psychological flexibility, and related influences can provide hospitals and nursing administrators with new perspectives and evidence for nurses' mental health management and career development.

2. Method

2.1. Study Participants. In August 2023, nurses from five public hospitals at level II and above in Anhui Province were selected as survey respondents using convenience sampling. Inclusion criteria encompassed the following: (1) possessing a nursing license; (2) working as a nurse for more than one year; and (3) informed consent to this study; exclusion criteria included the following: leave of absence such as vacation and further training.

2.2. Measurement

2.2.1. General Information Questionnaire. General information included age, sex, education, marital status, number of children, title, position, duration of employment, education, mode of employment, monthly income, and hospital grade status.

2.2.2. Simplified Version of the Psychological Resilience Scale. The original scale was the Connor–Davidson Resilience Scale [17]. The study was tested using the Chinese version of Laura Campbell-Sills [18], simplifying the 10-item entry [19]. The scale is based on a 5-point Likert scale with a positive scoring principle. It has shown good reliability and validity for testing mental health in the Chinese population. The Cronbach's alpha coefficient for this scale in this study was 0.933.

2.2.3. Acceptance and Action Questionnaire Second Edition. The second version of the Acceptance and Action Questionnaire (AAQ II) was developed by Hayes et al. and later adapted by Bond et al. [20]. The study used the Chinese version of Cao et al. [21], with 7 entries. Currently, there are more satisfactory applications for different Chinese populations. The scale measures acceptance and action on a 7-point Likert scale (from 1 = "never" to 7 = "always"), with higher total scores resulting in lower levels of psychological flexibility. The Cronbach's alpha coefficient for this scale in the present study was 0.973.

2.2.4. Growth Mindset Scale. This study uses the Growth Mindset Scale revised by Zhu et al. [22] in the context of Chinese culture, developed by Dweck et al., comprising three items. The scale is based on a 6-point Likert scale, with scores of 1–6 indicating complete agreement with complete disagreement; the higher the score, the better the level of growth mindset. The Cronbach's α for this study was 0.957.

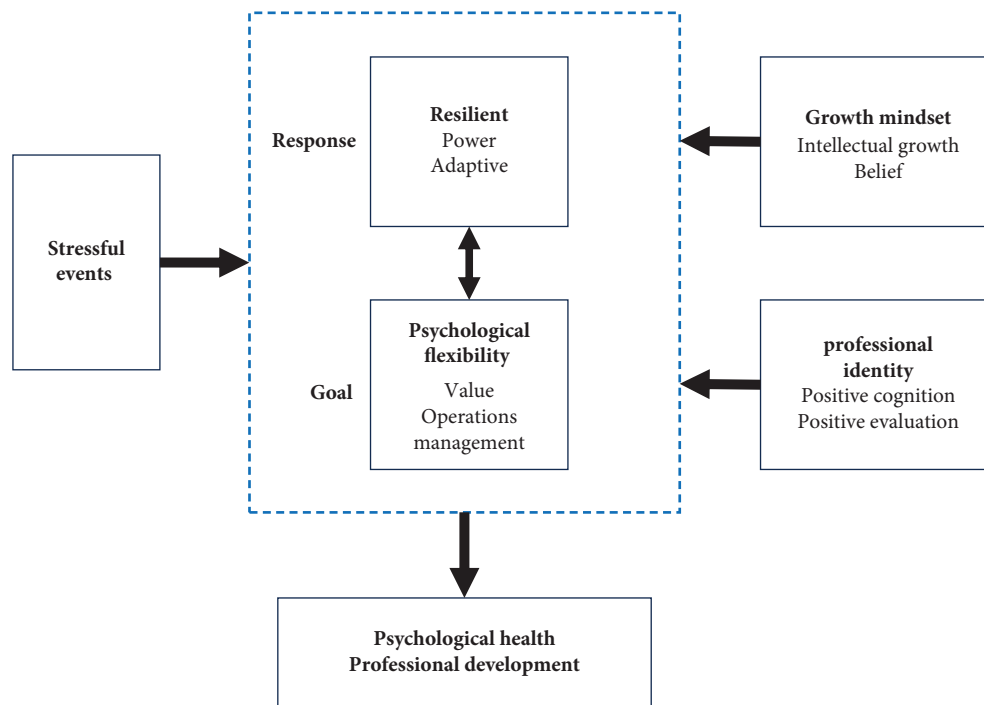


FIGURE 1: Combined framework of resilience and psychological flexibility models. In the face of stressful events, resilience and psychological flexibility comprise different psychological characteristics of a positive coping model with goal orientation. Resilience and psychological flexibility interact in the model and form a heterogeneous pattern by their different demographic characteristics. A growth mindset and professional identity had an influential role in the model. In summary, the resilience and psychological flexibility model influences mental health and professional development.

2.2.5. Nurses' Professional Identity Rating Scale. The original scale was obtained from the University of Tokyo, Japan, and a version translated by Fangli Deng from China was used in this study [23]. The scale was merged into five dimensions based on Chinese cultural conventions: sense of self-efficacy and grasp, sense of congruence, sense of self-determination, sense of patient and organizational influence, and sense of meaningfulness. The entries totaled 21 items and were rated on a 5-point Likert scale, with 1 to 5 indicating strongly disagree~strongly Agree, respectively. The scores were positively related to professional identity. This scale is widely used in the Chinese population. The Cronbach's alpha coefficient for the scale in this study was 0.969.

2.3. Data Collection. This involved explaining the purpose and method of questionnaire distribution to the heads of the nursing management in each hospital. After obtaining consent, you can fill out the questionnaire using the Internet, and you will be limited to one response per IP address. The questionnaire included an omission prompt to ensure the completeness of the information. Data in the web backend were exported if they were not updated for one consecutive week. The two researchers jointly verified and excluded invalid questionnaires; 805 valid questionnaires were returned, with a valid recovery rate of 94.15%. The study used a rough estimation of the sample size, and with the addition of approximately 20% meaningless questionnaires, the maximum number was 252, which was sufficient for this study.

2.4. Ethical Considerations. The study was approved by the Ethics Committee of Bengbu Medical University, and all participants provided informed consent before the investigation. The ethical approval number was Grant no. 2023369.

2.5. Statistical Analysis. The CD-RISC-10 is scored on a 5-point scale. In particular, with a value < 3 as the lower responder. The low responder group was estimated to be 0. Furthermore, a value ≥ 3 was the higher responder group, estimated as 1. AAQ II was scored on a 7-point scale, with ≥ 4 categorized as a low responder group and estimated as 0. In addition, a value < 4 was categorized as a higher responder group and estimated as 1. After the scores were standardized to dichotomous categories, potential category analysis was conducted using the Mplus 7.4 software. We used a range of test values to explore the most superior classification [24]. Akaike's information criterion (AIC), Bayesian information criterion (BIC), and corrected Bayesian information criterion (aBIC) with lower values indicated a better fit. When the likelihood ratio (LMR) and bootstrap-based likelihood ratio test (BLRT) are significant ($p < 0.05$), the classification of the k -class model is better than that of the $k-1$ class. Regarding the classification accuracy, the closer the entropy value is to 1, the better. More importantly, the final choice of the model must be fully observed for its practical implications [25].

Data were statistically analyzed using the SPSS software (version 26.0). Frequencies and percentages indicate qualitative data, while quantitative data obeying normal

distribution are expressed as mean \pm standard deviation ($\bar{x} \pm s$). Comparisons of scores between scales and modalities were performed using analysis of variance (ANOVA), and unordered categorical comparisons were performed using chi-square tests. The Fisher–Freeman–Halton test was used to measure the underfrequency of a particular cell, and the Kruskal–Wallis test was used to measure differences in continuous variables. Finally, multivariate logistic regression was used to analyze the factors influencing nurses' resilience and flexibility categories, which were statistically significant at $p < 0.05$.

3. Results

3.1. General Demographic Characteristics. A total of 805 nurses participated in this study. The results are summarized in Table 1. More than one-third were 30 years of age or younger (34.2%), primarily female (92.2%), and married (71.4%). 359 nurses (44.6%) had only one child, 412 nurses (51.0%) were mid-level, only 74 nurses (9.2%) were care managers, 205 nurses (25.5%) had been working for one to five years, 609 nurses (75.7%) had a bachelor's degree, 402 nurses (49.9%) were contracted employees, 383 nurses (47.6%) earned between \$5001–7000 per month, and 640 nurses (79.5%) worked in a tertiary care hospital as shown in Table 2.

3.2. Scale Scores. Resilience (37.96 ± 7.34); psychological flexibility (26.91 ± 10.75); growth mindset (11.35 ± 3.83); and nurses' professional recognition dimensions and total scores were 35.07 ± 6.34 , 16.57 ± 3.73 , 15.54 ± 4.12 , 25.62 ± 6.12 , 22.1 ± 4.54 , and 114.9 ± 22.32 points.

3.3. Latent Classes of Resilience and Psychological Flexibility. Exploratory latent class analyses were based on nurses' resilience and flexibility dichotomous scores. First, 1–5 models were established. The values of AIC, BIC, and aBIC in the model tended to be minor, and the LMR of the five classifications was >0.05 . Therefore, they were not considered. For the four categorical models, when both LMR and BLRT were significant, the curves of the four classifications were more complex, somewhat ambiguous, and challenging to interpret in terms of their theoretical and practical significance. By observing the three-category model with an entropy of >0.8 and both LMR and BLRT of <0.05 , the categorization is concise, and its functional relevance is more apparent. The results are summarized in Table 1. Ultimately, the best latent class was determined to be three.

3.4. Characterization and Naming of Different Models. Of the three classification schemes identified, the first group was named the "toughness-flexible group," which accounted for 32.8% of the total. In this group, the probability of scoring most items for resilience and mental flexibility was above 0.8, indicating that nurses in this group were more resilient and flexible. The second group was categorized as the "power-deficit-emotional group," which accounted for

23.1%. The perceived sense of strength against adversity was low, and the low-scoring entries in flexibility were emotional concerns and worries that led to stumbling. The third group was categorized as the "toughness-rigid group," which accounted for 44.1% of the total. This group is characterized by a degree of resilience but generally poor mental flexibility as shown in Figure 2.

3.5. Results of One-Way Analysis of Latent Classes of Resilience and Psychological Flexibility. Comparisons of nurses in the different resilience and psychological flexibility categories regarding monthly income, job title, and mode of employment revealed significant differences. The results are summarized in Table 3.

3.6. Comparison of Growth Mindset and Professional Identity Scores for Nurses in Three Latent Classes. A comparison of nurses in the three potential categories of resilience and psychological flexibility in terms of growth mindset and total professional identity scores revealed statistically significant differences ($p < 0.05$), as shown in Table 4.

3.7. Multiple Logistic Regression Analysis of Factors Influencing Latent Classes of Nurses' Resilience and Psychological Flexibility. Unsorted multicategorical logistic regression analyses were conducted using the potential categories of nurse resilience and psychological flexibility as dependent variables (with the toughness-flexible group as the reference) and variables statistically significant in the univariate analyses as independent variables and covariates. The results indicated that contract employment style was a predictor of the strength-deficit-emotional group; monthly income $< \text{RMB}5,000$, staffing agency, contract employment style, and growth mindset were predictors of the toughness-rigid group; and higher occupational identity and growth mindset together predicted the toughness-flexible group, as shown in Table 5.

4. Discussion

4.1. Monthly Income Mode of Employment can Affect Nurses' Resilience and Psychological Flexibility. Nurses earning less than RMB 5,000 per month were more likely to be in the rigid toughness group than in the flexible toughness group. In this group, nurses with families and children accounted for more than 2/3, and for their family consumption, a monthly income of less than 5,000 yuan was slightly constrained. An Australian study [26] states that low-income families may be more likely to adopt a child-focused spending plan that allocates less to the adult budget and often requires careful budgeting to meet the family's needs. The dual pressures generated by work and life lead to looking ahead and empirical avoidance when addressing other challenges. Psychological flexibility mediates perceived stress and negative emotions [27]. Based on the family systems' theory, poorer parental psychological flexibility leads to poorer family functioning [28].

TABLE 1: Potential category model fit indices for nurse resilience and psychological flexibility ($n = 805$).

Model	Log (L)	AIC	BIC	aBIC	Entropy	LMR (P)	BLRT (P)	Probability
1	-5454.491	10942.982	11022.726	10968.742	—	—	—	1
2	-3827.287	7724.575	7888.754	7777.609	0.955	<0.001	<0.001	60.4/39.6
3	-3607.693	7321.386	7570.001	7401.696	0.902	0.0191	<0.001	32.8/23.1/44.1
4	-3438.551	7019.102	7352.152	7126.686	0.929	0.0241	<0.001	27.1/8.6/45.4/18.9
5	-3324.538	6827.077	7244.562	6961.936	0.923	0.1165	<0.001	7.8/44.2/3.6/19.2/25.2

TABLE 2: Demographic characteristics of participants.

	Projects	Number	%
Age	<30	276	34.3
	<35	236	29.3
	<41	131	16.3
	≥41	162	20.1
Sex	Female	745	92.5
	Male	60	7.5
Education level	Junior college and below	193	24.0
	Undergraduate	609	75.7
	Postgraduate or above	3	0.4
Marital status	Unmarried	213	26.5
	Married	577	71.7
	Others	15	1.9
Number of children	0	261	32.4
	1	359	44.6
	≥2	185	23.0
Monthly income	<5000 RMB	260	32.3
	<7000 RMB	383	47.6
	≥7000 RMB	162	20.1
Working years	1~5	205	25.5
	6~10	178	22.1
	11~15	204	25.3
	16~20	82	10.2
	≥21	136	16.9
Position	Nurse	731	90.8
	Nursing managers	74	9.2
Professional title	Junior title	364	45.0
	Intermediate title	412	51.0
	Senior title	29	3.6
Employment relationship	Staffing of government-affiliated institutions	161	20.0
	Personnel agent	242	30.1
	Contractual employment	402	49.9
Hospital level	Contractual employment	640	79.5
	Tertiary hospitals and others	165	20.5

For nurses with families and children, the more negative emotions generated, the less family functioning and psychological flexibility.

Contractual hiring practices were an influential factor in the strength-deficit-emotional group compared to the toughness-flexibility group. Contractual employment is one of the most common methods of recruiting nurses. However, this may make nurses feel more apprehensive. In

certain cities in China, other modes of employment represent different jobs, hospital benefits, and professional statuses. In contrast, nurses employed on a contractual basis have relatively low educational qualifications, monthly incomes, and retirement benefits. Dr Kate interviewed nurses working temporarily in the UK, who reported feelings of isolation, fewer training opportunities, and difficulties in maintaining permanent jobs [29]. According to the job

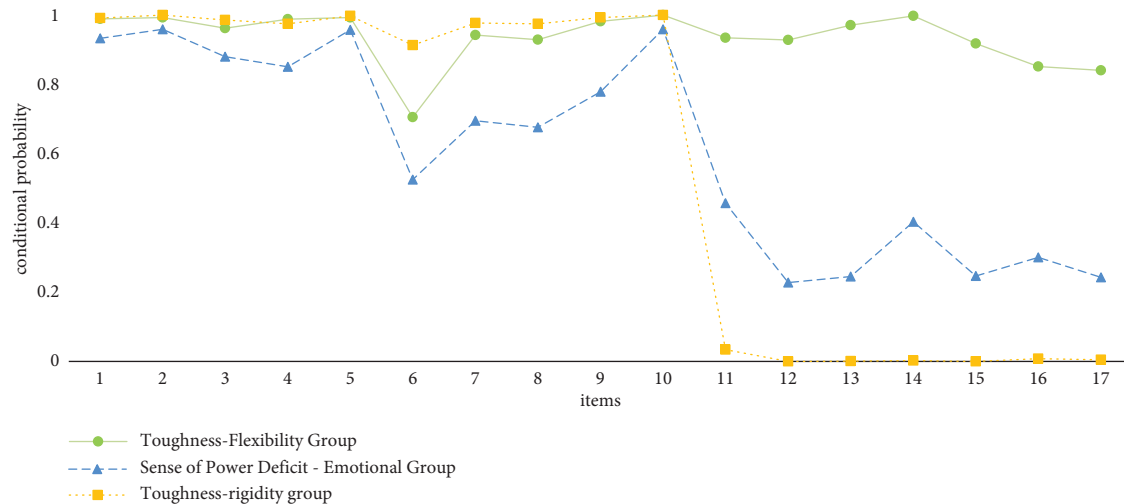


FIGURE 2: Conditional probability distributions for latent classes of resilience and mental flexibility.

demand resource model [30], when job resources are limited, demand fulfillment frustration occurs, and personal commitment to work decreases, which may ultimately lead to burnout or separation from service [31].

Personnel agencies and contractual hiring practices affected the toughness-rigidity group. This may have had a different influence on the two outcomes of toughness and mental rigidity in this group. The better flexibility in this group may have resulted from the personnel agency method of employment. A personnel agency is a new type of personnel management in which the Chinese government provides social services for talent. [32]. Compared with other forms of employment, staffing agencies consider the advantages of legal protection, flexible employment, and reasonable distribution of performance pay, among others. Most contractors are highly educated and qualified [33]. This implies favorable future career development and confirms the protective role of the professional dimension in the shield layer of resilient shield theory.

4.2. Growth Mindset as an Influence on Resilience and Flexibility of Nurses' Mindset. A growth mindset is a factor influencing the "tough-flexible" group and the "tough-rigid" group. A similar characteristic of both groups was a high level of resilience. After several major public health events, the nursing community underwent significant changes in professionalism and psychological adaptation [34]. Mental health and occupational psychology have received worldwide attention [35]. To prevent and recover emotional resilience from burnout, Jay encourages cultivating a growth mindset that can be used to enhance emotional resilience through the lens of positive psychology [36]. Raquel demonstrated significant correlations and predictions between psychological flexibility and resilience to minimize burnout and trauma among Spanish nurses during major public health events [37]. Growth mindset and mental flexibility, while not practical in prediction, showed statistically significant differences in

growth mindset in at least two groups in one-way outcome analyses. In short, the predictive effect of a growth mindset in this study appears to be related to nurses' resilience, and its relationship with psychological flexibility needs to be further demonstrated.

4.3. Professional Identity Affects Nurses' Psychological Resilience and Flexibility. Professional identity predicts toughness and flexibility. Zhou et al. concluded that nursing students with a high level of professional identity had positive perceptions and evaluations of the nursing profession, and their capacity for self-directed learning was higher [38]. Research has also demonstrated that people with higher levels of self-directed learning also tend to be more personally resilient [39]. Conversely, Chen further elucidated the critical role of resilience in work-family conflict and career development in his study, explaining why occupational identity is a high resilience predictor [40]. Chong et al. [41] conducted an online survey of 514 Hong Kong citizens whose sequential equation modeling showed that psychological flexibility directly affected prosocial behavior. Occupational identity includes how the wider society recognizes the work an individual does and is a way of demonstrating the individual's relationship with society [42]. Professional identity includes a great deal of prosocial identity.

4.4. Limitations. Our study had some limitations. First, our sample comes from only one province in Central China, and economic development and humanistic literacy differ across regions, which may result in a certain degree of bias. Second, there were more female nurses in the sample, which may have prevented comparisons from considering gender differences. Third, the sample size of tertiary care hospitals was large, and differences between different hospital levels may not have been available. Future studies should expand the sample to a national or multinational scale to extrapolate the results.

TABLE 3: Univariate analysis of 3 latent classes ($n = 805$, cases (percentage, %)).

Projects	Toughness-flexibility group ($n = 264$)	Sense of power-deficit-emotional group ($n = 186$)	Toughness-rigidity group ($n = 355$)	Statistical value	P value
Age	<30	98 (37.1)	121 (34.1)	3.919 ^a	0.141
	<35	60 (22.7)	123 (34.6)		
	<41	46 (17.4)	55 (15.5)		
	≥41	60 (22.7)	56 (15.8)		
Sex	Female	252 (95.5)	321 (90.4)	5.560 ^b	0.061
	Male	12 (4.5)	34 (9.6)		
Education level	Junior college and below	62 (23.5)	85 (23.9)	0.075 ^a	0.963
	Undergraduate	201 (76.1)	269 (75.8)		
	Postgraduate or above	1 (0.4)	1 (0.3)		
Marital status	Unmarried	75 (28.4)	86 (24.2)	4.464 ^c	0.341
	Married	187 (70.3)	261 (73.5)		
	Others	2 (0.8)	8 (2.3)		
Number of children	0	93 (35.2)	112 (31.5)	1.192 ^a	0.551
	1	113 (42.8)	155 (43.7)		
	≥2	58 (22.0)	88 (24.8)		
Monthly income	<5000 RMB	78 (29.5)	127 (35.8)	10.158 ^a	0.006
	<7000 RMB	119 (45.1)	175 (49.3)		
	≥7000 RMB	67 (25.4)	53 (14.9)		
Professional title	Junior title	122 (46.3)	161 (45.4)	0.578 ^c	0.749
	Intermediate title	133 (50.4)	183 (51.5)		
	Senior title	9 (3.4)	11 (3.1)		
Working years	1-5	78 (29.5)	86 (24.2)	4.177 ^a	0.124
	6-10	48 (18.2)	95 (26.8)		
	11-15	59 (22.3)	89 (25.1)		
	16-20	26 (9.8)	43 (12.2)		
	≥21	53 (20.1)	42 (11.8)		
Position	Nurse	230 (87.1)	332 (93.5)	7.430 ^b	0.024
	Nursing managers	34 (12.9)	23 (6.5)		
Employment relationship	Staffing of government-affiliated institutions	62 (23.5)	40 (11.5)	22.425 ^b	<0.01
	Personnel agent	94 (35.6)	86 (24.2)		
	Contractual employment	108 (40.9)	210 (59.2)		
Hospital level	Tertiary hospitals	201 (76.1)	296 (83.4)	5.895 ^b	0.052
	Others	63 (23.9)	59 (16.6)		

^bIndicates the χ^2 value. ^aShows the H value. ^cShows that the Fisher-Freeman-Halton test was used.

TABLE 4: Comparison of growth mindset and professional identity scores for nurses in 3 latent classes (scores, $\bar{x} \pm s$).

Groups	Number	Growth mindset scale		Nurses' professional identity rating scale					Total
		Total	Self-efficacy	Sense of consistency	Sense of self-determination	Sense of patience and organizational	Impact sense of meaningfulness		
Toughness-flexibility group	264	11.86 ± 4.095	35.25 ± 6.654	16.76 ± 3.878	15.6 ± 4.089	25.51 ± 6.315	22.25 ± 4.62	123.18 ± 17.919	
Sense of power-deficit-emotional group	186	9.86 ± 3.175	35.06 ± 5.735	16.45 ± 3.385	15.66 ± 3.721	25.86 ± 5.462	22.35 ± 4.079	107.82 ± 23.479	
Toughness-rigidity group	355	11.75 ± 3.741	34.9 ± 6.421	16.47 ± 3.811	15.42 ± 4.341	25.55 ± 6.321	21.84 ± 4.717	112.46 ± 22.823	
F value		19.147	0.237	0.551	0.264	0.207	1.016	31.929	
P value		<0.001	0.789	0.576	0.768	0.813	0.362	<0.001	

TABLE 5: Multivariate logistic regression analysis of influencing factors of different potential categories.

	B	SE	Wald χ^2	Pvalue	OR	95% CI
Position (concerning care managers)						
Nurse	0.004	0.34	0	0.99	1.004	0.516 1.954
Monthly income (taking ≥ 7000 as a reference)						
<5000	-0.16	0.288	0.307	0.579	0.852	0.485 1.499
<7000	0.048	0.256	0.035	0.851	1.049	0.635 1.733
Toughness-flexibility group						
Mode of employment (using the staffing of government-affiliated institutions as a reference)						
Personnel agent	0.358	0.28	1.631	0.202	1.43	0.826 2.477
Contractual employment	0.532	0.27	3.892	0.049	1.702	1.003 2.887
Growth mindset	-0.092	0.029	10.186	0.001	0.912	0.861 0.965
Professional identity	-0.03	0.005	33.542	<0.001	0.971	0.961 0.981
Position (regarding care managers)						
Nurse	0.3	0.302	0.987	0.32	1.35	0.747 2.442
Monthly income (taking ≥ 7000 as a reference)						
<5000	0.562	0.277	4.095	0.043	1.753	1.018 3.02
<7000	0.416	0.253	2.712	0.1	1.516	0.924 2.489
Sense of power-deficit-emotional group						
Mode of employment (using the staffing of government-affiliated institutions as a reference)						
Personnel agent	0.579	0.243	5.695	0.017	1.785	1.109 2.872
Contractual employment	0.79	0.233	11.472	0.001	2.204	1.395 3.482
Growth mindset	0.054	0.024	4.969	0.026	1.056	1.007 1.107
Professional identity	-0.027	0.005	35.493	<0.001	0.973	0.964 0.982

The toughness-flexibility group is taken as a reference category.

5. Conclusions

This is the first study to simultaneously examine the relationship between nurses' resilience and psychological flexibility. Moreover, this study empirically demonstrates the effects of a growth mindset and professional identity on psychological resilience and flexibility. According to our study, higher career identity predicted the toughness-flexibility group, a better growth mindset predicted high flexibility, and the relationship with psychological flexibility needs further validation. Different modes of employment and income levels are equally important factors affecting the resilience and flexibility of nurses. With the current significant nursing shortage, fair and varied career development for the nursing community is a must for healthcare providers.

5.1. Implications for Nursing Management. The percentage of poorly adapted groups in the different models explored in this study was 67.2%, indicating that more resilient nurses may experience poor psychological flexibility. By examining variables related to nurses' career development, we found that improving professional identity and a growth mindset contribute to the psychological resilience and flexibility of the nurse population. This also reflects the fact that good personal growth and professional development are beneficial for nurses' adaptive mindsets. By synthesizing work-related characteristics, nursing administrators and related leaders can make the following attempts: first, enhancing nurses' sense of professional identity and social recognition. Examples include education about the significance of the profession, a sense of respect, and the exploration of multiple channels to build career development paths and display platforms. Second, nurses need to develop a growth mindset, such as teaching practices and learning experiences that support personal development, competency-based medical education, matching vocational assessment programs to nurses' professional needs and purposes, and managers practicing encouraging language and building supportive interactions. Third, employment mechanisms should be reformed, job security implemented, and equal pay for equal work.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

This study was approved by the Ethics Committee of Bengbu Medical College (approval number: Grant no. 2023369).

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Xiumu Yang, Changjiang Yuan, Shuang Zhao, Zeyu Zhang, Xiaocui Duan, and Yujiao Shao contributed to the conception and/or design of the study. All authors contributed to data collection and analysis. Shuang Zhao drafted the manuscript and all authors contributed to refining and/or critically reviewing the manuscript. All authors are in agreement with the manuscript. All authors agree to be responsible for all aspects of the work. Shuang Zhao, Zeyu Zhang, Xiaocui Duan, Yujiao Shao, Fuzhi Wang, Yongxia Chen, Congyan Yang, Lingling Chen, Fei Wang, Jiaoping Zhang, Hailing Zhang, Xiumu Yang and Changjiang Yuan contributed equally to the study.

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Research Article

Seeking Protection in the Heart of the Storm: Findings from a Grounded Theory Study

Mehraban Shahmari ^{1,2} Nahid Dehghan Nayeri ³ Alvisa Palese,⁴ Seemin Dashti ^{5,6} and Arpi Manookian ⁷

¹Department of Medical-Surgical, School of Nursing and Midwifery, Ardabil University of Medical Sciences, Ardabil, Iran

²USERN Care (TUMS) Office, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

³Nursing and Midwifery Care Research Center, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

⁴Department of Medicine, University of Udine, Udine, Italy

⁵Department of Health Education and Promotion, Faculty of Health, Tabriz University of Medical Sciences, Tabriz, Iran

⁶Department of Nursing, Ardabil Branch, Islamic Azad University, Ardabil, Iran

⁷Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

Correspondence should be addressed to Arpi Manookian; manookianarpi@gmail.com

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Background. Nurse protection is a multifaceted concept that has become increasingly relevant in recent years. Despite its importance in effectively managing pandemics, there is still a gap in knowledge about how nurses achieve protection in hospitals. **Objective.** To describe the process of seeking protection among nurses during the COVID-19 pandemic. **Methods.** A grounded theory approach from 2020 to 2022, employing purposive and theoretical sampling. Face-to-face and online interviews were conducted with 25 participants, resulting in 29 interviews. Data analysis was carried out using Corbin and Strauss's method (2015). **Results.** The analysis revealed that nurses encountered numerous obstacles related to patients, nurses themselves, organizations, and the passage of time during the COVID-19 pandemic. These challenges were intertwined with three key concepts: transformations, inequalities, and emotional challenges, highlighting the multifaceted nature of nurses' protection concerns. In response, nurses employed a protective strategy bolstered by catalysts to address these challenges. This strategy encompassed both optimistic outlooks ("Bright horizon") and somber reflections ("Unpleasant reflection"). Ultimately, seeking protection in the heart of the storm emerged as the core concept, representing the multifaceted process through which nurses navigate and seek protection amidst the unique challenges posed by the pandemic. **Conclusions.** This study presents a comprehensive theory that explicitly explains the multifaceted process of seeking protection among hospital-employed nurses during a pandemic. The theory captures the interconnectedness of challenges faced by nurses and the protective strategies they employ while acknowledging the nuanced balance between hopeful prospects and sobering reflections. **Implications for Nursing Management.** Policymakers, managers, and educators can utilize the findings to improve nursing management and support systems. By increasing awareness, addressing challenges, and providing robust support, they can enhance the well-being and effectiveness of nurses during healthcare crises, ultimately improving patient care quality.

1. Introduction

The COVID-19 pandemic presented significant challenges to healthcare systems globally, especially affecting nurses who were at the forefront of patient care [1]. Nurses faced

extreme working conditions and threats to their protection and safety while caring for COVID-19 patients [2, 3]. They were exposed to both physical and psychological risks, resulting in infections up to deaths among healthcare workers [2–4].

Ensuring the protection and safety of nurses during a pandemic is crucial due to their vital role in managing infectious diseases and protecting public health [3]. In this study, the focus is on the protection and safety of nurses themselves, distinct from the concept of patient safety, which is also of paramount importance. The term “protection” refers to the measures and strategies nurses employ to defend themselves against the various threats and hazards they face, such as exposure to the virus, inadequate personal protective equipment (PPE), and high-stress levels.

Various theoretical perspectives, such as needs theory, managerialism, and motivational theory, have recognized the importance of different types of safety, including physical, psychological, professional, and social safety. These theories provide valuable insights into the multifaceted nature of safety. For example, Maslow’s hierarchy of needs positions physical safety as the second fundamental requirement, emphasizing its significance [5]. Herzberg’s theory distinguishes between hygiene factors and motivators about professional safety, encompassing elements like job security, adequate staffing, and growth opportunities [6]. The Job Demands-Resources (JD-R) model highlights the balance between demands and resources to ensure psychological safety, taking into account factors like heavy workloads and emotional stress [7]. Theoretical frameworks like social support theory or the JD-R model shed light on how social interactions impact the overall sense of safety and well-being [8]. By incorporating these theories, we can develop a comprehensive understanding of the importance of safety and its diverse dimensions for nurses during the COVID-19 pandemic. According to these theories, we can also better understand what happens when safety is threatened: nurses compromised safety can adversely affect their health, work quality, and performances, leading to dissatisfaction, increased absenteeism, and intentions to leave the profession [1, 3]. These factors ultimately result in poorer patient care and increased pressure on hospitals and healthcare costs [3, 4].

Given the unprecedented nature of the pandemic, prioritizing healthcare worker protection and safety was paramount to ensure effective patient care management [9]; in this context, learning from the experience lived by deepening nurses’ perceptions, behaviors, and interactions related to staff protection and safety is crucial [10]. Therefore, this study aims to shed new light on the concept of “seeking protection” as perceived by nurses. Nurses seek protection and safety not only as part of their responsibility of caring for patients affected by the COVID-19 infection but also from the various risks associated with their frontline duties, including exposure to the virus, PPE, and high-stress levels. Operationalizing this concept may inform how to mitigate these risks to protect nurses’ well-being while they fulfill their critical role during a pandemic. Consequently, qualitative research can uncover nurses’ experiences, feelings, and deeper perspectives, providing valuable insights to support and prepare healthcare professionals and improve organizational actions in future pandemics.

Available evidence suggests that seeking protection and safety among nurses is an interactive process rooted in

a specific natural context and reflects the group’s nursing-related and social interactions within a real work environment [11, 12]. This process can be influenced by the culture, norms, routines, and habits of each context. In particular, the unique characteristics of the context in Iran, such as the low nurse-to-patient ratio [13], lack of experience in dealing with a widespread pandemic, challenging economic conditions, and insufficient resources to combat COVID-19 [14], make it even more crucial to provide comprehensive information and gain a deep understanding of the process. Despite numerous research studies, the literature still indicates a knowledge gap in this area [15].

Therefore, this study aims to elucidate the multifaceted process of seeking protection among hospital nurses amidst the unique challenges posed by the COVID-19 pandemic, particularly in contexts with specific socioeconomic and healthcare system characteristics, such as the Iranian country.

2. Methods

2.1. Study Design and Setting. A qualitative study was conducted using the grounded theory [16–18]. Grounded theory aims to explore, understand, and describe psychological and social processes within natural social settings. By adopting this approach, the researchers immersed themselves in the participants’ world to gain insights and contribute to acquiring their experiential knowledge [19, 20]. Therefore, grounded theory was chosen to develop a theory from experiential data [20]. The methodology version proposed by Corbin and Strauss in 2015 was followed for its structured data analysis system, which is especially suitable for novice researchers [20, 21]. The study adhered to the Standards for Reporting Qualitative Research (SRQR) [22] (see Table 1 in the Supplementary file) and involved academic medical centers in two Iranian cities with populations of 13,267,637 and 1,270,420, respectively, between 2020 and 2022.

2.2. Study Participants. Researchers identified participants among nurses working in academic medical centers designated to care for COVID-19-positive patients using purposive sampling. The inclusion criteria included nurses educated at the level of Bachelor of Science in Nursing (BSN), which is the minimum nursing qualification in Iran. Additionally, participants needed to demonstrate an interest in communication and expressing their views and experiences, as this was considered essential for providing valuable insights. Furthermore, participants were selected based on their experience in caring for COVID-19 patients or working in facilities designated to receive such patients, ensuring firsthand knowledge and experiences, and thus helping in understanding the challenges faced in this context. These criteria were crucial in achieving the maximum theoretical richness and in-depth understanding of the experience lived by nurses [20]. Moreover, to achieve maximum theoretical variations, richness, and diversity, the researchers identified participants with diverse personal and professional

characteristics to obtain comprehensive data and develop findings with higher transferability. After the first interview, additional interviews were conducted based on the analysis of previous interviews and using a theoretical sampling [20]. For example, when the topic of “unsafety of non-COVID-19 wards” was developed, the first researcher felt the need to interview nurses who did not work in COVID-19 wards as the next step, which was agreed upon by a second researcher. Theoretical sampling continued until saturation was reached, as judged by the research team [20]. No friendship was established between the interviewer and the participants before the interview. A total of 27 nurses were contacted consecutively, and all agreed to be interviewed except for two who refused. The demographic characteristics of the participants are provided in Table 1.

2.3. Data Collection. A female researcher (MSh), educated at the doctoral level and holding a faculty position, conducted audio-recorded interviews with participants’ consent and collected field notes when necessary. The interviews started with an open-ended question: “Given your experience caring for COVID-19 patients (or during the pandemic for those not in COVID-19 wards, see Table 1), how did you protect yourself?” As data collection progressed, interviews followed a semistructured format, with questions like: “What influenced your actions?” After theoretical sampling, when some issues emerged as “inadequate support, discrimination, and dissatisfaction with PPE rationing,” interviews were then conducted with a head nurse and a supervisor responsible for coordinating shifts and PPE in COVID-19 wards. They were asked about challenges faced during the pandemic and strategies used to ensure nurses’ safety and protection. Subsequent interviews were guided by participant responses, with exploratory questions, such as: “Can you explain further?” and “Why?” Participants were given the chance to add to their comments at the end of each interview. Of the 29 interviews with 25 participants, 22 were conducted in person while adhering to protective protocols and seven were conducted by online video call via WhatsApp at the request of the participants. In these cases, four supplemental interviews were conducted to ensure the richness and depth of the interviews and to confirm the findings. The average, minimum, and maximum duration of the interviews were 50, 45, and 90 minutes, respectively, reflecting variations in the duration spent with each participant.

2.4. Data Analysis. The data analysis in the grounded theory method is a dynamic and circular process carried out through continuous and simultaneous comparison, data collection, and analysis, leading to the extraction of deep and reliable information about the phenomenon of interest [20]. In our study, the researchers used the method of Corbin and Strauss (2015) [16] to discover the basic theory, employing open coding to identify concepts, developing concepts in terms of their properties and dimensions, analyzing data for context, bringing the process into the analysis, and integrating categories to identify the core category [20].

The MAXQDA10 software was used to manage the large dataset, which consisted of about 580 verbatim-transcribed pages. Initially, one of the researchers (MSh) listened to the interviews, transcribed them, and reread the text and notes multiple times. The data were then segmented into manageable chunks, and semantic units were created.

Initial categories were formed through brainstorming and comparing concepts, with constant comparisons to classify codes based on similarities and differences. The researchers carefully considered both micro- and macro-conditions affecting nurses’ safety. Memos and diagrams were used from the beginning of the analysis to aid in this process. By analyzing data and reviewing narratives repeatedly, the researchers identified the interactions, feelings, strategies, and behaviors of participants. “Seeking protection in the heart of the storm” emerged as the core category, encompassing the experiences of all participants. Finally, the researchers examined the relationship between concepts and categories, developing a theory to explain the phenomenon under study. An example of the process of forming a main category is shown in Table 2 in the Supplementary file.

2.5. Trustworthiness and Rigor. To ensure the quality of our study, we applied the criteria proposed by Corbin and Strauss (2015), which include checkpoints for assessing the methodological consistency and the quality and applicability of a grounded theory-based study [20]. Additionally, we incorporated the criteria of credibility, dependability, confirmability, transferability, and authenticity as suggested by Guba and Lincoln [23]. Specifically, data were collected simultaneously in an iterative process, and actions and processes were analyzed and conceptualized rather than focusing on themes and structures. Comparative methods, such as constant comparison, were used to confirm or reject codes and categories, determine relationships between categories, and uncover hidden processes in the data. Inductive categories were developed through a constructive approach, and theoretical sampling was employed to identify variations in categories. We ensured prolonged interactions with participants, allocated sufficient time for data collection, maintained trustworthy communication, and involved member reviews. The research team reviewed extracted codes, compared themes, conducted discussions to reach consensus on issues, peer-reviewed the data, and preserved preliminary study documents. We also provided a detailed description of the research process, participant characteristics, and research context and selected diverse participants to ensure the applicability of the data to other similarly structured communities.

2.6. Ethical Considerations. The Ethics Committee of Tehran University of Medical Sciences (TUMS) granted ethical approval (IR.TUMS.FNM.REC.1399.193). All participants provided consent after receiving explanations about the study’s objectives, their voluntary participation, and their freedom to withdraw at any point. They were also given the option to choose the interview time and location. Permission was secured for audio-recording the interviews. Participants

TABLE 1: Participants' main characteristics.

Nurse ID [§]	Age [¶]	Gender	Marital status	Education	Employment status	Ward	Experience (years)	In COVID-19 ward (months)
1	35-39	Female	Single	MNSc [‡] student	Permanent civil employment	Critical COVID-19	13	12
2	40-44	Female	Single	BNSc [†]	Contract employment	Critical COVID-19	17	12
3	25-29	Male	Single	BNSc	Permanent civil employment	COVID-19 and non-COVID-19	5	12
4	25-29	Male	Married	BNSc	Contract employment	Critical COVID-19	2	12
5	35-39	Female	Single	BNSc	Permanent civil employment	Non-COVID-19	6	-
6	40-44	Female	Single	MNSc	Permanent civil employment	Critical COVID-19	17	5
7	30-34	Female	Married	MNSc student	Trainee nurse	COVID-19 and non-COVID-19	1	5
8	35-39	Female	Married	BNSc	Contract employment	COVID-19 and non-COVID-19	11	5
9	30-34	Female	Married	BNSc	Contract employment	Critical COVID-19	8	5
10	25-29	Female	Married	BNSc	Contract employment	Critical COVID-19	5	5
11	35-39	Female	Married	BNSc	Permanent civil employment	Critical COVID-19	17	5
12	25-29	Male	Single	MNSc student	Contract employment	COVID-19 and non-COVID-19	4	6
13	35-39	Male	Married	BNSc	Permanent civil employment	Critical COVID-19	10	8
14	30-34	Male	Married	MNSc	Permanent civil employment	Critical COVID-19	8	5
15	25-29	Male	Single	BNSc	Permanent civil employment	Critical COVID-19	4	3
16	35-39	Female	Married	MNSc	Permanent civil employment	Critical COVID-19	11	12
17	25-29	Female	Single	BNSc	Contract employment	Critical COVID-19	5	10
18	45-49	Female	Single	BNSc	Permanent civil employment	Critical COVID-19	20	1
19	25-29	Female	Married	MNSc	Permanent civil employment	COVID-19 and non-COVID-19	2	12
20	40-44	Female	Divorced	BNSc	Permanent civil employment	Wound specialist	13	20
21	25-29	Male	Single	BNSc	Contract employment	COVID-19 and non-COVID-19	6	20
22	30-34	Male	Single	BNSc	Contract employment	COVID-19 and non-COVID-19	6	20
23	45-49	Female	Married	BNSc	Permanent civil employment	Esophageal echocardiography	14	-
24	40-44	Female	Married	BNSc	Permanent civil employment	Angiography	18	4
25	45-49	Female	Married	MNSc	Permanent civil employment	Clinical supervisor	24	20

[§]Identity code; [¶]Age was provided in ranges to ensure anonymity; [†]Bachelor of Nursing Science; [‡]Master of Nursing Science.

were ensured regarding data confidentiality, including the deletion of audio files after the study and anonymization of all participants and working units in documents (e.g., Participant 1, P1). Subsequently, the audio files underwent verbatim transcription and anonymization.

3. Findings

3.1. Emerging Categories and Subcategories. The analysis of data gathered from participants uncovered a range of challenges that hospital nurses encountered during the COVID-19 pandemic. These obstacles encompassed various aspects, such as patient-related issues (e.g., increased patient load, poor patient compliance), challenges faced by nurses themselves (e.g., working conditions), organizational factors (e.g., human resource difficulties, inadequate protective measures), and the passage of time (e.g., from extreme reactions to normalization).

These conditions were found to be interconnected and gave rise to three key concepts: transformations, inequalities, and emotional challenges. These concepts reflected the complex and multifaceted nature of the issues faced by nurses in their efforts to ensure their protection and safety. In response to these challenges, nurses adopted a strategy of seeking protection, which was fueled by catalysts that propelled them in this pursuit.

The strategy of seeking protection exhibited both optimistic prospects, symbolized by a “Bright horizon,” and somber reflections, represented by an “Unpleasant reflection.” These contrasting elements shaped nurses’ approach to safeguarding themselves during the pandemic. Consequently, the core concept that emerged from this analysis was termed “seeking protection in the heart of the storm” as depicted in Figure 1 and elaborated upon in detail in Table 2.

3.1.1. Contextual Conditions. Participants emphasized the paramount importance of understanding the dynamics of safety pathways, including obstacles and catalysts, in shaping the journey toward safety and protection for hospital nurses during the COVID-19 pandemic. These contextual conditions consist of two main categories and six subcategories (refer to Table 2 and Figure 1), which have been identified as crucial in influencing the seeking protection process among frontline nurses. This in turn contributes significantly to their well-being and the effectiveness of patient care.

(1) Safety Pathway Obstacles. Participants indicated that they encountered a spectrum of impediments along the safety pathway categorized into four main challenges: organizational, patient/relative-related, time-related, and nurse-related challenges.

Organizational Challenges. The challenges faced by organizations have triggered several issues for nurses: staffing problems, difficulties in information gathering, in providing training; unfavorable infrastructure factors, time-consuming documentation for accreditation, and inadequate supervision, support, and organizational assistance were all

reported. Additionally, varying ward-related safety conditions were shared.

“In the first few days, we were suddenly sent to the COVID-19 intensive care unit without any training or preparation; we were confused. We did not know what was going to happen. It scared us, and many of my colleagues caught the virus.” (P 7)

Nurses shared their personal experiences with safety hazards related to the shortage and poor quality of PPE.

“The protective equipment was scarce and of poor quality. In the first few months, they gave us two N95 masks and told us to wash and reuse them.” (P 17)

Participants disclosed that organizational challenges led to various physical, psychological, and professional issues.

Patient/Relative-Related Challenges. According to participants, another factor impacting nurses’ safety and protection was dealing with patients and their relatives. This included ensuring patient care in challenging conditions, inadequate patient compliance, noncompliance among relatives/visitors, and high expectations from patients’ relatives regarding nursing care.

“In intubated patients, the stress is even greater, especially during resuscitation or suctioning. The cardiopulmonary resuscitation team, which is more directly involved, told us that the risk of infection increases when a bag valve mask is administered manually.” (P 10)

Regarding safety risks related to noncompliant visitors, one nurse reported:

“Companions and visitors are fully or partially non-compliant on the ward. For example, they don’t use masks or just put them over their mouths. No matter how strictly we follow the rules, their non-compliant behavior puts us at risk and increases our fear and anxiety.” (P 21)

Another nurse emphasized the safety threat posed by relatives in response to unexpected outcomes.

“We often faced situations where patients arrived late, worsening their condition. For instance, they were brought in when their lungs were already inflamed. If such patients were then connected to life support machines and unfortunately passed away, their relatives would direct aggression towards us, blaming us for the outcome.” (P 16)

Time-Related Challenges. The passage of time has had a significant impact on working conditions, the availability of PPE, and the responses of caregivers during the early and later phases of the pandemic. Time has played a role in how nurses achieve safety, with changes in their psychological reactions influencing their adherence to safety protocols. Initially, nurses experienced intense anxiety and fear, leading

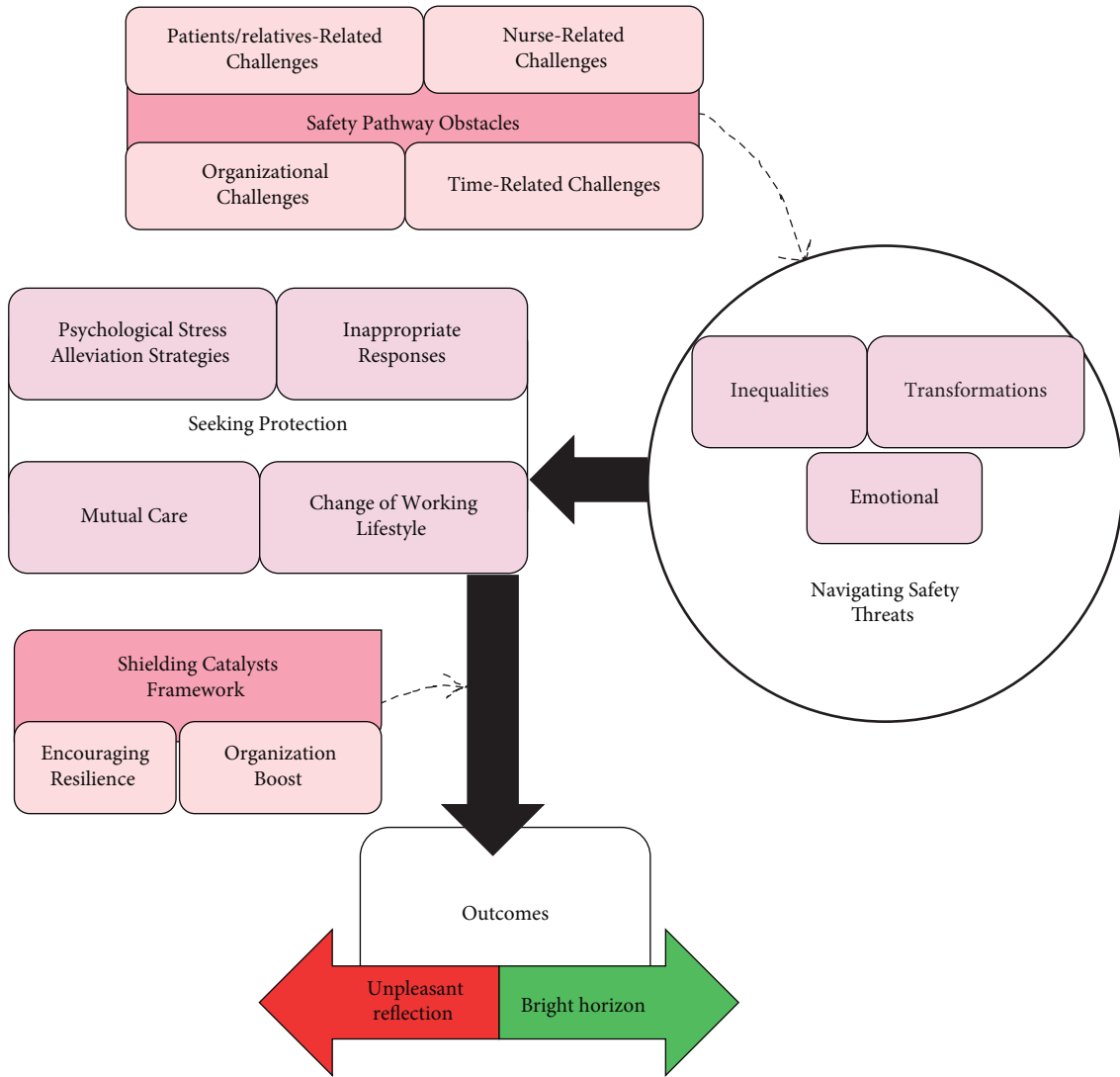


FIGURE 1: The structure and the process of the “seeking protection in the heart of the storm” theory.

TABLE 2: The process of “seeking protection in the heart of the storm” among hospital nurses during the COVID-19 pandemic.

Paradigm components	Categories	Subcategories
Contextual conditions	Safety pathway obstacles	Organizational challenges Patient/relative-related challenges Time-related challenges Nurse-related challenges
	Shielding catalysts framework	Encouraging resilience Organization boost
Navigating safety threats	Transformations	Changes in personal life Professional transitions
	Inequalities	Intraprofessional inequalities Interprofessional inequalities
	Emotions	Unpleasant emotional repercussions Reason-emotion dichotomy Sadness of stigma
Strategies	Seeking protection	Change of working lifestyle Inappropriate responses Psychological stress alleviation strategies Mutual care

TABLE 2: Continued.

Paradigm components	Categories	Subcategories
Outcomes	Bright horizon	Satisfaction Physical protection Individual stress
	Unpleasant reflection	Organizational vulnerability Patient injury

to strict adherence to protocols. However, as time passed, they began to return to a sense of normalcy.

“In the beginning, we had difficulties with the lack of protective equipment or inferior masks. In the first few months, they gave us a single N95 mask for a week and told us to wash and reuse it, but in the beginning, we adhered more strictly to protocols out of deep fear and anxiety. Over time, however, our sensitivity weakened, and some colleagues no longer took the disease seriously.” (P 21)

Nurse-Related Challenges. According to participants, nurse-related factors directly affect them as microconditions influencing their access to safety. These factors include the nurses’ response to immunizations, which ranged from opposition to acceptance of vaccination. Other factors include the nurses’ living conditions, how they commute to work, their personal-social characteristics, personality traits, underlying disease status, and their willingness to work in the COVID-19 unit.

“I’m married and have two children. I also take care of the housework. I cooked for my family even when I was sick. With the heavy equipment we use, I’m constantly on my feet even while I’m working; from the time I arrive to the time I return home. I mean, I’m completely worn out and my body has become weak. I’m exhausted. This is the case with most of my colleagues who have children. On the other hand, we’re more anxious and worried that our children might catch it.” (P 8)

On the contrary, a nurse living alone shared a contrasting experience:

“I reside alone, so I didn’t notice many changes at home compared to my colleagues who live with family. However, when I fell ill, I faced significant challenges. Being alone, there was no one to provide care or assistance. I had to manage everything on my own, which made the situation extremely challenging. I felt a profound sense of isolation and lack of support during this difficult time.” (P 21)

(2) **Shielding Catalysts Framework.** Participants’ experiences revealed that alongside various hindering factors, certain enabling elements played a role in enhancing nurses’ safety, albeit with a lesser impact. These elements collectively form the “Shielding Catalysts Framework,” encompassing two subcategories: “Encouraging Resilience” and “Organization Boost.”

Encouraging Resilience. Supportive feedback and positive reinforcement were vital in bolstering nurses’ resilience and well-being. Participants highlighted the significance of receiving encouragement amid challenging circumstances, including support from family members showing empathy. Positive feedback from peers, friends, and the community served as a source of hope and motivation, fostering their ability to withstand stressors and maintain psychological safety.

“My father used to say, “You must work under such circumstances.” He said, “For the education you have, you have to serve the people.” That added to my peace of mind, and I could bear the difficult situation better, but my husband was a little upset that I was working in the COVID ward.” (P 19)

Organization Boost. The proactive stance of health authorities in implementing supportive measures reflects a commitment to fostering conducive work environments. Participants emphasized the significance of these initiatives, such as facilitating transfers for staff facing unique challenges, prioritizing vaccination for healthcare workers, and implementing motivational strategies. These efforts were instrumental in mitigating nurses’ psychological stress and enhancing overall well-being.

“Breastfeeding and pregnant nurses and those with health problems were isolated, and they didn’t allow this group to stay in the COVID ward. That alone made my colleagues and me feel like they cared about our health and our children’s health, which was a factor in nurse satisfaction.” (P 16)

3.1.2. **Navigating Safety Threats.** The contextual conditions identified as obstacles and catalysts shaped the nurses’ perceptions of safety threats and challenges. These were represented by three categories and seven subcategories (refer to Table 2 and Figure 1). The categories, named “Transformations,” “Inequalities,” and “Emotional,” reflect the multifaceted nature of the issues faced by nurses in ensuring their safety.

(1) **Transformations.** Transformations refer to significant changes in the personal and professional lives of nurses due to the challenging working conditions brought on by the COVID-19 pandemic. The circumstances of nurses’ personal and family lives have been dramatically altered.

“There is no way to plan anything. Our education is interrupted. Our work and personal lives are in limbo. My whole life is on hold.” (P 13)

In addition, there were both positive and negative changes at the professional level that impacted nurses' access to safety. The "Transformations" category encompasses changes in both personal life and professional transitions.

Changes in Personal Life. Participants stated that they had made changes in their daily lives since the beginning of the COVID-19 pandemic to ensure the highest level of safety. However, some of these changes led to excessive fatigue and vulnerability of their immune systems.

"I change my clothes in the parking lot and hang them in the storage room. Then I go straight to the bathroom and sometimes shower twice a day. I was really scared when I contracted the virus, especially after the second infection." (P 9)

Some nurses mentioned that their attitude toward life has changed compared to before the pandemic triggering the capacity to see more meaning in their lives and a more positive outlook. They decided not to be overwhelmed by details, to value time with loved ones, and to seize the moment. This new attitude provided them with inner peace, reduced their fear of the virus, and possibly increased their psychological safety.

"My attitude toward life has changed compared to the time before the pandemic. I owe this change to the coronavirus. Now I enjoy every moment I spend with my loved ones. I have decided to ignore trivial things because I have seen death up close. Trivial things should not destroy the value of being together. This change in my perspective has brought me peace." (P 16)

In many cases, the mentioned changes caused disruptions in the normal flow of personal and family life, also delaying or interrupting daily plans. At the family level, these changes were evident in restricted emotions, families' worries about the nurses' health, disapproval of the nurses' work in the COVID-19 ward, concerns about inadequate supply of PPE, and fear of getting infected and coming to the hospital. These factors, in turn, increased the psychological pressure on nurses.

"In the first few months, I was going straight to my room when I was coming home from the hospital because I was afraid of infecting my family. Even my mother would put my food behind the door so I could pick it up later. I did not talk to my family at all, which was very worrying for both my family and me." (P 1)

Professional Transitions. Participants experienced difficult transitions at the professional level, including changes in performance and professional wellness triggering burnout. They also rediscovered their passion for the nursing

profession. Nursing care was delivered with extreme caution, but poor nursing care caused by factors such as fear of being close to patients resulted in changes in nurses' performance. These changes posed threats to nurses' psychological safety, leading to psychological exhaustion and discomfort.

"The workload was so heavy that there was no coordination among the staff, and most of them were rookies. The crowding and extreme pressure were exhausting. Sometimes I completely forgot when I had visited my patients, and my duties were limited to administering medications and I was not able to attend to the other needs of the patients, which put a lot of stress on me." (P 17)

The unfavorable working conditions, the heavy workloads, long and busy shifts, limited support, witnessing patients' pain, suffering, and death, and other issues caused nurses to experience severe fatigue, physical and mental trauma, sleep disturbances, nightmares, and a sense of helplessness.

"The working conditions here are extremely difficult. You care for one patient, only to discover that another one requires your attention. Despite only being assigned two patients, the workload seems never-ending. Occasionally, due to staffing shortages, we are forced to care for three patients at once. This has drained our energy and left us lacking the motivation to carry on." (P 19)

In contrast, the media and public attention given to the nursing profession and nurses fostered a sense of worth and altruism, and ultimately rediscovered love for the profession among nurses.

"The COVID-19 pandemic raised some awareness in society about nurses, the nursing profession, and its values and risks. It made us happy, motivated us, and eased the psychological burden for me and my colleagues. Therefore, I think the nursing community should be grateful for the COVID-19 pandemic, although it has suffered a lot." (P 24)

(2) *Inequalities.* During the pandemic, nurses experienced a variety of unfair treatments and discrimination within and between professions, negatively affecting their psychological, physical, and professional safety.

Intraprofessional Inequalities. Intraprofessional inequalities refer to the disparities between nurses within the same center or between nurses in different centers. Some participants pointed out that there was inequity in the allocation of sick leave among nurses with varying employment statuses. Additionally, there reported perceived inequities among nurses based on their years of experience working on the COVID-19 ward and being assigned to critically ill patients.

“There was a difference between agency staff and permanent or contract nurses. For example, we weren’t entitled to sick leave if we got infected. And they wouldn’t pay for it if we left work. This made us frustrated and unmotivated.” (P 8)

One participant described the impact of employment status on nurses’ safety as follows:

“After a few months, they refused to pay us because we were contract workers. Some of my friends and I had to work in two places to make ends meet. Now, this arrangement of working in two places exhausted us and weakened our immune systems. On the other hand, job insecurity was getting to us.” (P 22)

Participants also mentioned that there were differences between nurses at different centers in various areas regarding PPE allocation and financial compensation, which caused psychological distress.

“Well, I heard that the nurses in hospital X receive financial allowances in addition to full PPE kits, while we barely manage to ration our PPE. Why does it have to be this way? It added to the psychological burden for us.” (P 12)

Interprofessional Inequalities. There were various forms of inequality among physicians and nurses in terms of PPE allocation, patient visitation protocols, and compensation, including the “COVID-19 bonus.” There were also disparities between nurses and administrative staff, as well as external organizational inequalities.

“There was a difference between us and the physicians in terms of getting equipment. They easily got as many pieces as they requested, but for us, it was rationed. Even now, we get our N95 masks under our doctor’s name in our station. This kind of treatment by the authorities was hurtful to us.” (P 10)

The other level of inequity was between nurses and administrative staff in the form of diagnostic laboratory test accessibility.

“Well, despite the protocol to do the PCR test for us, the nurses would compulsorily do the tests only in the case of presenting severe clinical symptoms in the almost-dying phase! But the administrators could easily test themselves once in a while. Well, that kind of thing puts psychological stress on you.” (P 11)

Some nurses expressed feeling discriminated against when they observed administrators in other organizations readily approving sick leave and providing free PPE for their

administrative colleagues. These factors worsened the psychological distress experienced by the nurses.

“You know, compared to hospitals, other organizations care much more about the health of their employees. For example, I have a relative who works somewhere else. They get sick leave for even the mildest symptoms and get PPE not only for themselves but also for their family members. . . .” (P 17)

(3) *Emotional Challenges.* Emotional challenges included unpleasant emotional repercussions, the experience of reason-emotion dichotomy that arose from confronting phenomena that contradict professional values, and the experience of stigma associated with COVID-19.

Unpleasant Emotional Repercussions. Most participants experienced various unpleasant psychological effects, such as fear, terror, intense anxiety, and dread of an unknown future. As the pandemic lasted for a long time, they also underwent changes in psychological effects, such as experiencing a depressive and sad phase, weakening nurses’ immune systems, and jeopardizing their safety.

“For example, my colleagues used to talk about another year [of the pandemic crisis]. Then they would say to me, “Given how things are going, do you think you’ll survive another year? I doubt it very much. . . . there’s a kind of depressed mood.” (P 15)

Reason-Emotion Dichotomy. Moral dilemmas arose from confronting double-sided phenomena that contradict professional values. The lack of facilities forced them to prioritize care, leading to anguish and problems for the nurses in the form of guilt.

“We had a shortage of ventilators This was very stressful psychologically and led to additional fatigue.” (P 4)

Sadness of Stigma. Sadness of stigma included negative behaviors and attitudes, labeling, avoidance, and rejection related to nurses, especially those in direct contact with COVID-19 patients. Nurses experienced various stigmas, from their families to their neighbors, colleagues, and the public. The perceived stigma posed a threat to the safety of the nurses.

“The avoidance behavior of others was hurtful. But what did we do? We were taking care of patients in terrible conditions. At the same time, others, including some family members, friends, and people, annoyed us by giving us strange looks, avoiding us, and even saying nurses were sources of infection.” (P 21)

3.1.3. Strategies. Several strategies have been implemented by participant nurses represented by the “seeking protection” category, as articulated in four subcategories (Table 2 and Figure 1). These strategies implied changes in working lifestyle, inappropriate responses, efforts to reduce psychological stress, and providing mutual care. All of these strategies have been enacted to help nurses stay on track despite the challenges they face.

(1) Change of Working Lifestyle. Nurses employed several strategies to improve their work lifestyle. These strategies included taking preventive measures, regulating the arrival and departure of companions/visitors, issuing safety alerts, educating patients and their caregivers, conducting peer training, seeking help, obtaining information from credible sources, practicing self-care due to a lack of PPE, managing physical trauma, and lodging complaints to authorities regarding their workplace protection.

“I would try to get information from clinical supervisors, doctors, or university professors about COVID, such as how to protect myself and control the disease.” (P 2)

Inappropriate Responses. According to participants’ experiences, the onset of the pandemic led to increased work pressure and fatigue, which resulted in the adoption of inappropriate responses. Some nurses displayed maladaptive responses to the COVID-19 crisis, such as aggression toward patients and companions, avoidance of certain situations, negative coping mechanisms, contact avoidance, obsessive protection, and secrecy. These responses were linked to negative outcomes, such as increased personal tension, strain within the organization, and potential harm to patients.

“Some people’s avoidance behavior made me conceal my work in the COVID ward. Whenever someone asked, I would deny that our center had cases of coronavirus. However, my conscience kept bothering me, reminding me that I was in close contact with patients and needed to ensure their immune systems were not compromised to get severe illness.” (P 17)

Psychological Stress Alleviation Strategies. One strategy that significantly helped in reducing psychological stress and improving well-being was filtering incoming information, spending time with family and friends, turning to spirituality, engaging in recreational activities, fostering hope, creating a positive environment, desensitizing, seeking medical assistance, and trying to combat stigma.

“When I take breaks, I listen to one of my favorite songs on my phone to lift my spirits.” (P 9)

These strategies decreased psychological pressure, enhanced relationships, physical well-being and immunity, improved sleep quality, and better management of physical issues.

“Since I started exercising and focusing more on spirituality, like reading the Quran before bed, my nightmares have ceased. I also experience less stress and fewer heart palpitations.” (P 21)

Mutual Care. Mutual care, expressed in the form of asking for and giving family support, limiting interactions, being stricter about personal hygiene than ever before, practicing self-care, using alternative treatments, and supporting colleagues, was a strategy used by most participants due to their sense of responsibility for others. These strategies played an important role in restoring calm to the family and improving relationships. However, during the ongoing pandemic, the strategy of self-quarantine, which prevented the opportunity to give and receive mutual support, induced feelings of sadness.

“During this time, we canceled all gatherings, funerals, and weddings, even visits to our parents, because I was afraid of being a carrier and infecting others. We haven’t taken a trip in two years.” (P 20)

3.1.4. Outcomes. Outcomes of using the strategies mentioned above to protect oneself and others varied between two categories (Figure 1 and Table 2) as

- (1) “Bright horizon” indicates satisfaction (reduction of psychological stress, improvement of relationships, and restoration of family peace) and physical protection (immunity, reduction of sleep problems, and management of physical problems)
- (2) “Unpleasant reflection” indicates individual stress (increased likelihood of infection, physical complications, regret, feelings of neglect, and sadness), weakening of the organization (exacerbation of the lack of power, greater spread of disease, and a decrease in trust), and the risk of harm to patients (delivering poor quality of care, compromising patient safety, and being dissatisfied with patients and their relatives). However, with the increased scientific understanding of the COVID-19 disease nurses continued to seek protection in the heart of the storm but the contextual factors changed:

“As time goes on, I feel that everyone has gotten over the shock, that scientific information is increasing, that training groups are being formed in the hospital, and that there is some comfort in hearing that the disease can be controlled if you increase your knowledge and follow the protocols.” (P 6)

4. Discussion

The theory “seeking safety in the heart of the storm” explains how nurses navigate safety challenges during pandemics, incorporating concepts, such as transformations, inequalities, and emotional challenges. It highlights the balance between hopeful outlooks and sobering reflections,

ultimately leading to the core concept of seeking protection in the heart of the storm. By drawing on established theories like coping, resilience, and social support, a comprehensive framework emerges to understand nurses' safety-seeking behaviors [24, 25]. Additionally, it aligns with Kang and colleagues' model (2023) of "seeking to protect the safety of oneself and the patient" to describe the experiences of nursing students facing safety-threatening conditions and their adaptation process [26]. Our theory compares well with that of Kang et al., addressing obstacles, positive and negative influencing factors, effective and ineffective strategies used by nurses to maintain protection, and resulting outcomes. As a result, it stands as a comprehensive theory for understanding the adaptive strategies of nurses during crises.

First, contextual factors emerged as influencing the protection of hospital nurses during the COVID-19 pandemic, shedding light on the obstacles and catalysts that shape their journey toward safety and protection. Among the organizational challenges, staffing, information gathering, and training [27], protection issues and unfavorable infrastructure factors emerged, as in previous studies [3, 28]. Additionally, inappropriate monitoring and supervision, lack of organizational support [29], and varying ward-related protection conditions [30] also emerged as already well-documented, indicating that nurses worldwide have faced similar organizational conditions. However, the time-consuming documentation appears to have played a significant role in Iran, suggesting that digital transformation may ease this burden in the future.

In terms of patient/relative-related challenges, they appear to be similar to those reported in previous studies [31]. The presence of patients and their families has been highlighted as crucial for nurses in alleviating distress [32]. Consequently, harassment, frequent calls and follow-ups, unreasonable expectations, and misconceptions among patients and relatives pose a serious threat to nurses' safety and health [33, 34]. Also, these findings are in line with those reported in previous studies. However, noncompliance with restrictions or preventive measures was also reported, possibly due to the emotional bonding in Iranian culture between family members and patients' relatives demanding the lifting of visiting restrictions. Moreover, nursing-related factors have also been documented in previous studies, such as reactions to vaccination [35], living conditions [36], transportation to work [37], personality [38], underlying disease [39], and willingness to visit the COVID ward.

The experiences of nurses during the pandemic showed a spectrum of psychological reactions. Initially, nurses were confronted with negative feelings, such as anxiety, fear, shock, and stress. Over time, they adapted to the new working conditions, but also showed symptoms of depression, a sense of hopelessness in the face of the never-ending situation, and occupational burnout due to the ongoing challenges of the pandemic [28, 36].

The shielding catalysts framework acted as a guiding light for nurses navigating the path to protection during the COVID-19 pandemic, incorporating elements, such as fostering resilience and enhancing organizational support.

Societal and family support played a crucial role in enduring difficult conditions and enhancing self-esteem, and readiness for work [36, 40]. Various forms of support, such as providing information, extending work shift intervals, offering childcare facilities for nurses' children, and mental support, greatly contributed to nurses feeling secure [36].

Nurses' perceptions of safety and protection threats and challenges were influenced by contextual conditions. These influences gave rise to three main lived experiences, each closely tied to concerns about safety and protection: "transformations," "inequalities," and "emotional challenges." The first refers to forced and deliberate changes in personal life [31, 41] requiring modifications to achieve peace of mind, such as showing more appreciation for life and spending time with family as a form of "psychological growth" [36]. Moreover, changes at the professional level were also reported: a different mode of care was delivered in terms of human interaction and physical contact with patients [42] requiring professional changes in the performance and limiting the nurses' presence in the patient room, i.e., due to the fear of contracting the virus, the need to reduce physical contact with patients [43], and PPE deficiencies [36]. Occupational burnout and the negative experience in these transformations seem to be contrasted by the nurses' sense of competence, accomplishment [40], and pride [31], which may have increased the professional commitment, satisfaction, and intention to continue to work as a nurse [44].

Inequalities are another emerged core category: discrimination has been reported as increasing during the COVID-19 pandemic [45], leading to different reactions that negatively affect both professional engagement and performance. Nurses' moral dilemmas have also increased, as reported elsewhere [46]. Despite their efforts to save lives, nurses have often been considered a source of viral transmission during the COVID-19 pandemic [40]. A lack of adequate awareness in society is one of the main reasons for occupational stigma [47], and providing sufficient information may help to reduce it [48]. Overall, the emotional challenges that result may have triggered the intention to leave the profession [49], a phenomenon largely documented in the postpandemic era.

"Seeking protection" was the term used to describe the strategies employed by nurses to protect themselves and others. "Changing the working lifestyle" involved adhering to preventive measures in the wards, managing lockdowns, and safety alerts; seeking help and training; obtaining information from credible sources; self-managing PPE shortages; and complaining to authorities about the need for protection in the workplace, as documented in previous studies [28, 40]. However, in their efforts to safeguard themselves, nurses resorted to inappropriate strategies, such as avoidance (of situations or contacts), aggression (toward patients or relatives), or obsession (such as excessive searching for protection). Avoidant behavior was reported in studies involving nurses during the Ebola outbreak [50], while compulsive behavior in following protocols was reported by nurses in Turkey and Qatar [40, 51]. This ineffective behavior may further escalate feelings of being

unsafe and negatively impact the work environment climate and personal well-being of nurses.

In applying “Psychological Stress Alleviation Strategies,” several actions undertaken have already been documented. Examples include filtering incoming information, interacting with family and friends, resorting to spirituality and leisure activities, fostering a sense of hope, creating a joyful atmosphere, seeking medical help [52], and attempting to combat stigma by concealing facts, limiting relationships, and following protocols more strictly [40, 51, 53]. Providing “mutual care” to protect themselves and others, self-impairing intense isolation [31, 36, 43], strictly adhering to protective protocols, and the fear of losing relatives have also been documented [54]. The support and help that colleagues provide to each other using compassion and collaboration techniques in the workplace ease the workloads and enhance nurses’ sense of safety [36, 40]. Discussions with colleagues and receiving updates and information from managers who listened and responded to feedback have been highlighted as being more helpful than external support mechanisms [55].

The perceived outcome varied between “Bright horizon” and “Unpleasant reflections.” The former was reported in other studies, such as in a protective feeling among caregivers after vaccination [56], and increased resilience and peace of mind due to trust in God and the use of self-care strategies [52, 57]. On the other hand, the latter can result in overlooking the role of family members in the care process [29, 53] or further compromising the safety and quality of care [30, 58].

4.1. Limitations. Our study has several limitations. First, due to the qualitative nature of the study, our findings may not be generalizable to other communities or contexts. Second, some interviews were conducted via video calls based on participant preferences, potentially limiting the depth of shared experiences. Third, while the extended study period (2020 to 2022) allowed for the development of a theory encompassing all pandemic stages, its validity requires confirmation across different cultures, countries, and pandemic waves. Fourth, the study focused solely on hospital nurses; therefore, the theory should be validated in various settings, disciplines, and professions to achieve a more comprehensive understanding of the phenomenon, which could impact all healthcare professionals.

5. Conclusions

To the best of our knowledge, despite numerous studies on nurses’ perceived safety during the recent pandemic, a comprehensive grounded theory describing the process of seeking protection by frontline nurses has not been formulated to date. With this qualitative inquiry, we attempted to address this gap by delving into how hospital nurses sought protection during COVID-19.

At an overall level, the study developed the “seeking protection in the heart of the storm” theory, illustrating nurses’ efforts during the pandemic. Available literature has

already produced evidence; however, the fragmented evidence has not been included in a comprehensive picture. Nurses faced various challenges, termed “Safety Pathway Obstacles,” including organizational, patient-related, temporal, and nurse-specific issues. These challenges coalesced into three themes: Transformations, Inequalities, and Emotional Challenges, emphasizing the complexities of safety in nursing care. Despite these obstacles, nurses adopted protective measures, implying lifestyle adjustments and coping strategies, resulting in both positive outcomes (satisfaction, well-being) and negative outcomes (stress, patient harm). Taken together, the results highlight the intricate interplay of adversity, resilience, and practices adopted by nurses during difficult times. Findings provide a composite picture depicting nurses striving to achieve safety to shield themselves and their families from the relentless impact of the disease. This imperative accentuated their awareness and dedication to navigating toward safety, prompting the adoption of diverse strategies, some effective and others not, propelled by the urgent need to secure safety. These choices significantly influenced outcomes, leading to either positive or negative consequences. In essence, the research sheds light on the intricate nature of nurses’ experiences and underscores the crucial role of nurturing supportive work environments and policies to enable effective coping mechanisms. By acknowledging the challenges confronted and the strategies employed by nurses, healthcare institutions can offer better support to frontline workers, thereby improving overall patient care outcomes. These elements can inform informative, educational, and organizational strategies at the local, regional, and national levels, aiming to capitalize on the lived experience of nurses in a proactive strategy to protect them during difficult times.

6. Implications for Nursing Management

Developing a theory can enhance our understanding of phenomena informing customized preventive measures and evaluating their effectiveness. First and foremost, there is an urgent need for a cohesive strategy to protect nurses, acknowledging their safety as a public health priority. Additionally, investments in cultural, educational, and organizational resources should prioritize nursing roles at both macro- and microlevels. Third, promoting individual preparedness is crucial. It is important to acknowledge that not all strategies employed by nurses yield positive outcomes, emphasizing the importance of effective coping strategies.

Moreover, researchers should evaluate the theory’s applicability across different contexts and cultures to ensure its empirical validity. Policymakers, managers, and educators can use the emerged insights to inform decision-making and educational initiatives according to nurses’ concerns and coping mechanisms. In clinical settings, healthcare professionals, especially nurses, can learn from successful strategies to enhance care provision during crises. Embedding process of seeking protection into nursing education and healthcare provider training programs can further enhance preparedness.

Data Availability

The data supporting the findings are available from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

Authors' Contributions

Mehraban Shahmari, Arpi Manookian, and Nahid Dehghan Nayeri designed the study, investigated, curated the data, conducted the analysis, and wrote the original draft. Seemin Dashti investigated the study, curated the data, and wrote, reviewed, and edited the study. Alvisa Palese collaborated on the data analysis, theory development, manuscript writing, and revision. All authors read and approved the final version for submission.

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Supplementary Materials

Standards for Reporting Qualitative Research (SRQR) and an example of the process of forming a main category as a supplementary material file will be submitted with our manuscript. (*Supplementary Materials*)

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Research Article

Senior Nurse Manager Perceptions of Nurse Practitioner Integration: A Quantitative Study

M. Ryder ¹, G. Lowe ², P. Gallagher ³, V. Plummer ², J. Mcentee⁴, A. Driscoll ⁵,
and E. Furlong ¹

¹School of Nursing, Midwifery and Health Systems, University College, Dublin, Ireland

²Institute of Health & Wellbeing, Federation University, Ballarat, Australia

³Nursing & Midwifery, Ireland East Hospital Group, Dublin, Ireland

⁴Nursing & Midwifery, RCSI Hospital Group, Dublin, Ireland

⁵School of Nursing & Midwifery, Deakin University, Centre for Quality & Patient Safety Research (QPS), Austin Hospital, Geelong, Australia

Correspondence should be addressed to G. Lowe; g.lowe@federation.edu.au

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Aim. To determine Senior Nurse Managers' perceptions of integration of Nurse Practitioner roles in Healthcare Organisations across Ireland and Australia. **Background.** Introduction of the Nurse Practitioner role in both countries is well established with national policies aimed at developing a critical mass in the health workforce. Current policy requires Senior Nurse Managers to be actively involved in the introduction of and oversight of the integration of Nurse Practitioners across healthcare settings. This is integral in the context of the success and sustainability of the services provided by the Nurse Practitioner. **Methods.** A quantitative, cross-sectional cloud-based survey of senior nurse managers across Ireland and Australia from April to September 2022. **Results.** Of 300 responses received, 122 were eligible for analysis. Of these, 77% expressed that there should be a specific role to support the integration of Nurse Practitioner roles at local level, and 61% recommended that this should occur at a national level, whilst 48% reported the absence of a standardised governance structure. Three reporting structures were identified: professional, clinical, and operational. Autonomous clinical decision making and prescribing were two Nurse Practitioner functions most identified. Fifty-five percent reported having performance indicators for Nurse Practitioner roles, with 24% agreeing that performance indicators captured the quality of care provided. Thirty-five percent of senior nurse managers indicated that there were agreed reporting timelines for performance indicators and a requirement for the provision of an annual report. **Conclusion.** Whilst some participants reported structure to guide and evaluate the work and value of Nurse Practitioners, the approach was inconsistent across organisations and countries. This paper demonstrates that integration is not broadly established across both countries. **Implications for the Profession.** The main findings were that Nurse Practitioners were misunderstood and the development of a structured framework to support the integration of Nurse Practitioners would provide long-term benefits.

1. Introduction

Nurse Practitioners (NPs) are clinical nurse leaders and a key component in healthcare transformation and healthcare reform [1]. In response to the current global workforce challenges and increased demands on health services, NPs have been shown to reduce fragmentation of care and improve the patient journey whilst improving efficiency of service provision [2] and to be cost-effective [3].

NPs practice autonomously and independently within agreed caseloads in the Irish context and scopes of practice in the Australian context [4]. They undertake care across broad contexts and settings—wide-ranging both geographically and clinically—and are capable of reducing health service gaps and increase services where wait times for treatment are excessive [5, 6]. Further, evidence supports a reduction in hospital transfers when NPs are involved in care [7], that hospital readmissions reduced and safe

prescribing increased with the inclusion of NPs in service delivery [6, 8].

Integration of NPs for the purposes of this research is referred to as a process of embedding the roles into the healthcare teams through organisation change at the micro and macrolevels [9]. The integration of NP roles depends on a structured, multilevel support system to ensure they are embedded within the service rather than remain as an “add-on” [2, 10]. The complex multilevel support required involves clinical support to facilitate clinical practice, team support whilst team dynamics are being redesigned, system-wide support in the form of strategic direction from nurse managers, and financial support from the organisation [10]. This framework by Contandriopoulos et al. [10] was previously used to explore NP perceptions of integration in the Irish context [11].

Previous research has identified that the sustainability of NP roles requires planning and support to ensure the role is adequately integrated into service provision [2]. Despite this, recent research identified that a structured approach was lacking in relation to the integration of NP roles into acute healthcare organisations, potentially leading to missed opportunities to demonstrate the true value of NPs in healthcare and long-term sustainability of roles [11]. These factors support further research in the area on NP integration.

Whilst there are a number of NP integration frameworks emerging, there is no international collaboration to date on this issue. Previous research has affirmed that the NP regulatory framework and roles are comparable [4]. The research team concluded this was an opportunity to explore NP integration from an international perspective between countries with similar regulatory frameworks.

2. Background

Previous work has highlighted the need for effective leadership to drive changes necessary for NP integration and to overcome the barriers presented by existing organisational structures and professional cultures [2]. Leadership, specifically through challenging current structures and facilitating and enabling change of healthcare service delivery, is supportive of NP integration [2]. Integration of NP roles is reported as problematic globally, with inconsistent utilisation of NPs, and ineffective policy and governance issues [12, 13]. Porat-Dahlerbruch et al. [13] identified macrolevel NP integration factors at national policy level, such as pay scales and focused healthcare policies related to healthcare delivery. Organisational factors and institutional policies supporting streamlined governance structures are known as mesolevel factors, and microlevel factors relate to inter and intraprofessional relationships and clear understanding of roles and responsibilities within healthcare teams [13]. Chouinard et al. [14] identified that Directors of Nursing were the key stakeholders enabling NPs to enact their role to its full potential and that nurse managers are the most useful source of support to define and develop NP roles in a primary healthcare setting.

Current Department of Health policy in Ireland supports the increase of Registered Advanced Nurse Practitioner (RANP) roles to achieve a critical mass target of 2% of the

workforce [15] in targeted areas. This target has been achieved (Nursing and Midwifery Board of Ireland [16]). An evaluation of this policy implementation in Ireland by Brady et al. [6] referred to the key barrier to successful implementation of the Department of Health policy was the requirement for organisational governance. There is no standardised governance structure for NP integration in Ireland [11].

In the current Australian context, the Nurse Practitioner Workforce Plan (called The Plan) aims to increase the number of NP roles nationally and ensure they are working to their full scope of practice [15]. The Plan [15] acknowledges that the integration of NPs into workforce planning assists in a whole of workforce planning framework, achieved through better understanding of roles by health workforce planners, healthcare teams, and consumers of health.

Despite the varying national policies, previous research comparing the NP roles across Ireland and Australia has determined that there is no significant difference in the work of both roles [17]. The same research reported that the leadership activities were validated by NPs in both Ireland and Australia, supporting the similarities in both roles [4, 17].

A NP integration framework was proposed by Contandriopoulos et al. [10]. The framework identified five factors for the successful integration of NPs in a primary care setting. The original factors included planning, role definition, practice model, collaboration, and team support. The framework was previously modified to explore NP perceptions of integration in one healthcare region in Ireland. The modification resulted in the identification of four distinct categories in a NP integration framework which included planning, governance and support, role definition and consensus, collaboration and referral, and outcome and performance measurement. This modification is reported in detail by Ryder and Gallagher [11].

3. The Study

3.1. Aim. The study’s aim was to determine senior nurse managers’ perceptions about the integration of Nurse Practitioner roles in Healthcare Organisations across Ireland and Australia.

3.2. Objectives. The research questions were generated under four distinct categories for NP integration, defined by Ryder and Gallagher [11]. The survey questions were rephrased from Ryder and Gallagher [11] for the purpose of this study: (1) planning, governance, and support; (2) role definition and consensus; (3) collaboration and referral; and (4) outcome and performance measurement. The objectives of this research are to

- (1) Identify the perceptions of governance and support necessary by nurse managers to integrate NP roles
- (2) Ascertain senior nurse managers’ perceptions of role definition and whether consensus exists
- (3) Determine senior nurse manager perceptions of specific outcome and/or performance measures used to evaluate NP practice

4. Methods

4.1. Design. The study was a quantitative, cross-sectional cloud-based survey. Participants of interest were senior nurse managers across Ireland and Australia.

4.2. Setting, Sampling, and Recruitment. The population for the current study included senior nurse managers in Australia and Ireland. Primary recruitment was via social media and targeting professional nurse management associations in Ireland and Australia. Convenience and snowball sampling was used to enable participants to share the study information with colleagues and others within their organisations and networks. It is not possible to know the exact figures of the population as there was no database to describe this figure.

A snowballing technique was used to disseminate (1) a flyer and (2) a plain language information sheet (PLIS) providing details of the study aims, which also included a link or QR code to enable direct access to the online survey. The research team included managers, clinicians, and academics. The team disseminated the invitation to the survey among their own networks with a request to forward to other potentially suitable participants. The invitation included the flyer and/or the PLIS so the link could be accessed directly. The survey remained open online between June and September 2022. For the purposes of this study, senior nurse manager roles include

- (1) Director of Nursing
- (2) Assistant Director of Nursing
- (3) Directorate Nurse Manager
- (4) Director of Midwifery
- (5) Clinical Manager
- (6) Director of Education
- (7) NP/RANP (Australian and Irish terminology, respectively)

4.3. Sample Size. Convenience and snowball sampling was used to identify and recruit Senior Nurse Managers across Ireland and Australia. A power analysis was not undertaken for this study as it is not possible to determine the number of senior nurse managers working in Ireland or Australia.

4.4. Instrument. An online survey instrument was designed by the research team to survey senior nurse managers. The concept for the instrument was based on previous research by Lowe et al. [2]. The instrument was modified following an exploration of existing literature on the topic from Contandriopoulos et al. [10] who developed a framework for nurse practitioner integration in primary care. Development of the online survey instrument modified from Contandriopoulos et al. [10] framework is described in detail by Ryder and Gallagher [11]. There are four sections in the instrument of Ryder

and Gallagher [11]. Questions in the instrument were adapted for senior nurse managers for the purpose of this research using Qualtrics® software.

The final instrument for this study was composed of four sections, namely, planning/governance and support (9 items); role definition and consensus (9 items); collaboration and referral (2 items); and outcome/performance measurement (9 items). In addition, the questionnaire included demographic items (5), questions exploring previous experience working with NPs (6 items), and two open-ended questions. There were a total of 42 items in the final survey instrument (available upon request). The survey was tested for face validity among five senior nurse managers working in healthcare regions in Ireland and Australia. The senior nurse managers were randomly selected by members of the research team. No modifications to the survey were recommended following review. Reliability was tested during analysis. The survey was hosted on the Qualtrics platform and accessed via a direct link or QR code.

4.5. Quality Appraisal. The first appraisal sought to identify incomplete responses. All responses with less than 70% completion were removed to ensure the quality of data collected was optimal [18]. Secondly, where responses indicated the role title was inconsistent with our inclusions (see Section 4.3) the responses were removed.

4.6. Data Abstraction. Data were exported directly from the cloud-based survey platform Qualtrics® to SPSS® for analysis.

4.7. Data Analysis. Data collected from the closed questions were analysed using IBM SPSS Statistics (Version 27). Descriptive statistics were used to summarise and describe the data. Content analysis was used for the open questions to determine themes, concepts, and relationships in the data, using a technique described in [19]. This process involved descriptions and interpretations of various levels of abstraction and interpretation [20].

4.8. Ethical Considerations. Submissions were made to the relevant ethics committees with approval numbers LS-E-22-23-Ryder and B22-022 provided as evidence of approval for the study. A participant information document was embedded into the survey which required selection of “I consent to participate” to access the cloud-based questionnaire. A flyer was prepared for social media recruitment with survey access links embedded. All responses were anonymous.

5. Results

A total of 300 responses were recorded in the cloud platform. Of those, 122 responses were identified as suitable for analysis. The results will be presented using subheadings consistent with those in the survey.

TABLE 1: Demographics.

	Ireland N (%)	Australia N (%)	Total N (%)
<i>Age</i>			
25–44 years old	29 (24)	5 (4)	34 (28)
45–64 years old	77 (63)	26 (21)	103 (84)
<i>NPs in organisation</i>			
Previous experience working with NP/candidate NP (NP in preparation)	96 (79)	26 (21)	122 (100)
Currently working with NP/candidate NP (NP in preparation)	90 (74)	26 (21)	116 (95)
<i>Place of work * (total = 135) 13 people selected more than one option</i>			
Metropolitan hospital	52 (43)	14 (11)	66 (54)
Metropolitan community	7 (6)	1 (1)	8 (7)
Regional hospital	28 (23)	7 (6)	35 (29)
Regional community	3 (2)	1 (1)	4 (3)
Rural hospital/community	14 (11)	4 (3)	18 (14)
Remote area	2 (2)	2 (2)	4 (4)

*Participants were permitted to select more than one option for work location.

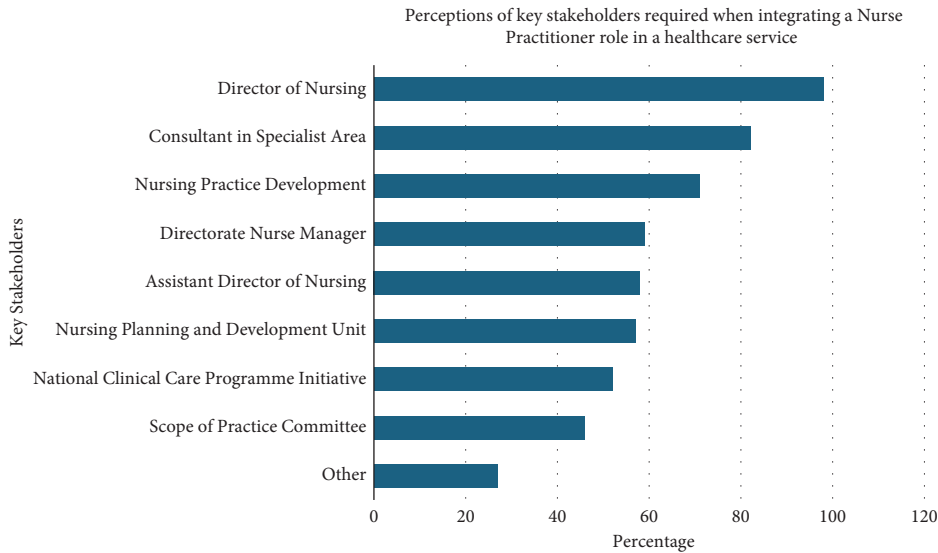


FIGURE 1: Key stakeholders required in healthcare organisation to integrate NP role. *Other: nurse practitioners/health service managers/patient representatives/administrative and financial personnel/departmental staff.

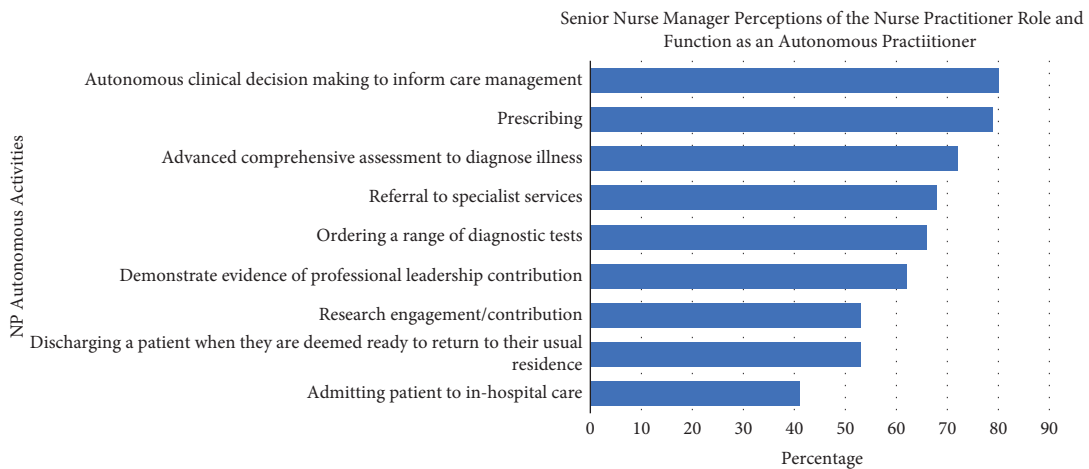


FIGURE 2: Senior nurse manager perception of NP autonomous functions.

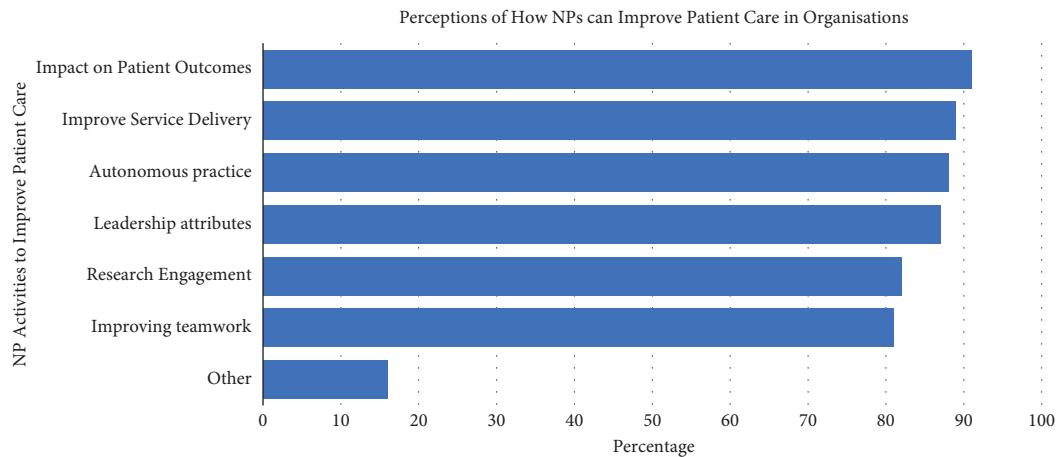


FIGURE 3: Senior nurse manager perceptions of how NPs can improve patient care in organisations. *Other: Continuity of care/educating staff/integration across acute and community/role modelling.

5.1. Demographics. The majority ($n = 91$; 75%) were in the 45–64-year-old age category. The mean years in nursing was 28 (SD 8) and mean years in the current role was 10 (SD 7). The majority were from Ireland ($n = 106$; 87%) and identified working in a metropolitan area ($n = 52$; 43%), Table 1.

All participants reported having previously worked with NPs or NPs in preparation, and 95% ($n = 116$) currently have NPs or NPs in preparation working in their organisation. The average number of NPs (whole time equivalent (WTE)) per organisation was 10 (SD 13; range 0–92) NPs in preparation $M = 6$; $SD = 8$; range 0–36.

Participants were asked to identify the top 3 gaps in service delivery that could be addressed by NPs to improve patient care. The most common areas identified were chronic disease management ($n = 12$), cardiology ($n = 11$), and mental health ($n = 10$), followed by diabetes and cancer ($n = 8$) and then respiratory and outpatient services ($n = 6$). Other clinical areas included dermatology ($n = 5$), women's health ($n = 4$), endocrinology and endoscopy ($n = 2$), and wound care ($n = 1$).

5.2. Planning, Governance, and Support. The second category in the survey related to items that identified opportunities for NP roles, support for integration into organisations, and advocates for the role. A majority expressed an opinion that there should be one specific role (single person) to fulfil this remit within an organisation ($n = 94$; 77%) and a single person responsible for identifying opportunities nationally ($n = 75$; 61%). The open text response indicated that this should be a senior nurse manager position at the level of Assistant Director of Nursing or above.

Participants identified the Director of Nursing position and the consultant (medical) in the specialist area as the two key stakeholders required when integrating the NP role into a healthcare service (Figure 1).

A higher proportion of participants ($n = 59$; 48%) reported that there was no standardised governance structure for the development/expansion and integration of the NP role in organisations. These participants selected that a standardised governance structure was required. The key stakeholders identified by participants for inclusion were senior

nurse manager roles, consultants, allied health professionals, hospital governance, and service user representation to ensure roles are properly integrated into healthcare organisations.

Ninety-three percent of participants ($n = 113$) indicated a requirement for a three-dimensional reporting structure for NPs. This included professional reporting to the Director of Nursing ($n = 95$; 78%), clinical reporting to the medical consultant in specialist area ($n = 89$; 73%), and operational reporting with less clear responses to a Directorate Nurse Manager/Assistant Director of Nursing/Business Manager for the specialist area ($n = 59$; 48%). Additional reporting structures included regional and national nurse leaders and the regulator.

5.3. Role Definition and Consensus. Participants were asked to identify the autonomous functions of NPs from a list provided. The two functions identified most commonly were (1) autonomous clinical decision making to inform care management and (2) prescribing (Figure 2). The open text comments were related to (1) a lack of understanding by colleagues and other healthcare professionals of the NP role, (2) the need for additional time and support for NPs to engage with research outputs related to their service, and (3) concerns related to admission rights and referral for investigative procedures.

Participants were also asked to identify how they believed NPs could improve patient care within their organisation (Figure 3).

The majority ($n = 102$; 84%) indicated the presence of a specific job description for NPs within their organisation. Preparation of the job description was the role of the consultant in the relevant specialist area ($n = 103$; 84%) and the Director of Nursing ($n = 98$; 80%). Sixty-five participants (53%) reported that there was no agreed process to review NP roles and job descriptions ($n = 53$; 43%).

5.4. Outcome and Performance Measurement. Fifty-five participants (43%) reported that NPs in their organisation had agreed performance indicators (KPI). It was the opinion of some participants ($n = 58$; 47.5%) that the agreed KPI did not capture the quality of care provided by NPs. Forty-three

participants (35%) reported that there were agreed KPI reporting timelines, with the same number (35%) reporting that NPs provide annual reports of activities. One question was related to the sustainability of NP roles. Participants were provided with a drop down option box and the ability to choose “all that apply.” The top three factors identified by senior nurse managers were (1) support from nursing management ($n=87$), (2) organisational culture ($n=86$), and (3) medical management support ($n=80$).

Participants were provided with an opportunity to make any further comments to the researchers related to NP role integration through open text comment options in each category. Content analysis on the responses concluded that (1) work is required on the development of governance procedures to safeguard the future sustainability of the roles, for example, “annual report should be mandatory” and “national job description for specialties”; (2) integrating the role with interprofessional colleagues, for example, “a multidisciplinary committee so that stakeholders are engaged from the outset” and “multidisciplinary forums to present achievements”; and (3) that NP voices must be heard, for example, “NP/ANPs need to be more proactive and find a voice” and “NP/ANPs need a national voice.”

6. Discussion

There was a paucity of literature exploring senior nurse manager perceptions of NP roles internationally and this was the first time they had an opportunity to report their understanding of the roles against clear components of NP practice. A number of key findings were evident from the results of this study. First, whilst there was overall support for NP roles, a lack of understanding of the autonomous function of the role and scope of practice was evident. Further, governance of NP roles once implemented was reported as ad hoc and evaluation was unclear. Third, there was inconsistency between reporting research as an activity to improve patient care and understanding of NPs' engagement with research.

Consistent with previous literature, the first key finding of this study was that senior nurse managers in Australia and Ireland perceived that NPs were capable of autonomous practice and that their roles could have a positive impact on patient outcomes. Senior nurse managers reported a range of areas within their organisations where patient outcomes could improve with the addition of NP roles, particularly chronic disease management, cardiology, and mental health—areas identified as priorities by governments in both countries.

Whilst the majority of senior nurse managers (80%) reported their perceived understanding of the autonomous function of NPs included prescribing medicine and treatment, the majority of participants did not perceive that the autonomous role included admitting and discharging patients by NPs (41% and 52%, respectively). Despite national standards outlining admission and discharge of patients within the scope of NP roles [16, 21, 22], there is a discrepancy between the reported perception of these autonomous functions indicating a lack of understanding of these

clinical responsibilities. This finding suggests that the role and function of NPs lacks clarity for some senior nurse managers and could result in missed opportunities for working to full scope of practice. The International Council of Nurses (ICN) definition of NP scope of practice is:

A Nurse Practitioner is an Advanced Practice Nurse who integrates clinical skills associated with nursing and medicine in order to assess, diagnose, and manage patients in primary healthcare (PHC) settings and acute care populations as well as ongoing care for populations with chronic illness [23].

This finding was consistent with recent evidence that NPs report a lack of understanding of their role across a variety of healthcare settings [4, 24]. It is also widely acknowledged by NPs themselves that their role is largely misunderstood, despite role clarity being essential to successful integration [25, 26]. With senior nurse managers identified as playing an important role in NP role integration [14], it is crucial that a full understanding of the current roles and future potential can be harnessed. The process of introducing and incorporating the NP role into any healthcare organisation is a key integration attribute to the successful outcome and sustainability of the role in the long term [13].

The second key finding was that senior nurse managers indicated very high expectations of NPs' ability to improve service delivery and patient care outcomes. There was a clear indication that NPs improve healthcare service delivery within organisations, which was consistent with previous literature [1]. However, a concern identified in this research indicated that there was a lack of agreed process to review or evaluate the NP roles, the NP patient population/eligible patients, and job descriptions. Almost half (44%) of senior nurse managers reported that NPs have outcome/performance measures, yet they reported that (1) the performance measures did not accurately capture the quality of care (24%); and (2) that outcome/performance measures were not a priority for role sustainability (46%)—again possibly due to the lack of clarity and/or understanding. Whilst Chouinard et al. [14] reported that Directors of Nursing were the key stakeholders enabling NPs to enact their role to its full potential and that nursing managers are the most useful source of support to define and develop NP roles in a primary healthcare setting, managers seldom reported meeting with NPs to clarify their roles. There are several reasons why it is vital to evaluate all NP services. There are several reasons why it is vital to evaluate all NP services, including; 1) planning for future workforce, 2) understanding patient sensitive outcomes, 3) identify the effects on organisational goals and 4) demonstrate and showcase the outcomes associated with NP roles on patient care [27].

The third key finding was the incongruity in senior managers' perceptions of NP engagement in research activities. Most participants reported that engaging in research activities would improve patient care; however, understanding of this activity as a function of the NP role was rated much lower. This finding is consistent with previous literature, with results that (1) 3% of

NP work related to research, (2) all NPs indicated it was not supported by nurse managers, and (3) most NPs completed research in their own time, suggesting a misunderstanding of what constitutes research engagement [4, 17]. A translational research framework for NPs has been proposed in the literature which identifies the range of NP activities aligned to research engagement within the framework [11]. Examples of the activities included are implementing evidence-based practice (EBP) through guideline development and evaluation of the NP services provided. Smigorowsky et al. [28] propose that little is known about the outcome of NP work due to the poor quality of research produced. Failure to understand the value and importance of research engagement and supported time dedicated to research activities within the role inhibits the development and enhancement of research skills.

6.1. Strengths and Limitations. One of the key strengths of this research is that it is the first time there have been clear variables provided for senior nurse managers to report their understanding of the NP roles.

Limitations of the research include factors associated with the response rate which made it difficult to stratify the results by role of employment. The sample population was consistent across both countries; however, there were more responses from Ireland than Australia and legislative differences may have impacted responses. The role of individual participants may also have influenced their responses.

6.2. Recommendations for Further Research. The first recommendation for further research is the development of a framework to support the structured approach to NP integration across health services. The framework should include the three multilevel factors described by Chouinard et al. [14] but further incorporate the horizontal layers necessary for NP clinician and nurse manager support across systems [14]. The second recommendation is for NP job descriptions to be established as live documents, regularly reviewed by the NP and senior nurse manager. This third recommendation is to support the accurate evaluation of the value NPs add to service and therefore patient outcomes including the value of research engagement.

7. Conclusion

The study has highlighted that there continues to be positive perceptions of the ability for NPs to improve service delivery and patient care. However, understanding of the full scope of practice of NPs and therefore the potential benefits to health services is yet to be identified and fully appreciated. This work is aimed at the mesolevel described by Porat-Dahlerbruch et al. [13] with findings supporting the need for a structured approach to NP integration in healthcare organisations [29].

7.1. Implications for the Profession. The main findings indicate that NPs were misunderstood and that the development of a structured framework to support the integration of Nurse Practitioners would provide long-term benefits.

Data Availability

The survey data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Simulation-Based Education as a Solution to Challenges Encountered with Clinical Teaching in Nursing and Midwifery Education in Malawi: A Qualitative Study

Gertrude Mwalabu ¹, Annie Msosa ¹, Ingrid Tjoflåt ², Kristin Hjorthaug Urstad ³,
Bodil Bø ², Eva Christina Furskog-Risa ⁴, Patrick Mapulanga ⁵,
and Masauko Msiska ⁶

¹Department of Adult Health Nursing, School of Nursing, Kamuzu University of Health Sciences, Lilongwe, Malawi

²Department of Quality and Health Technology, Faculty of Health Sciences, University of Stavanger, Stavanger, Norway

³Department of Public Health, Faculty of Health Sciences, University of Stavanger, Stavanger, Norway

⁴Department of Caring and Ethic, Faculty of Health Sciences, University of Stavanger, Stavanger, Norway

⁵Library Department, Kamuzu University of Health Sciences, Lilongwe, Malawi

⁶Department of Biomedical Sciences, School of Life Sciences and Allied Health Professions, Kamuzu University of Health Sciences, Lilongwe, Malawi

Correspondence should be addressed to Patrick Mapulanga; pmapulanga@kuhes.ac.mw

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Nursing and midwifery education in Malawi entails theoretical learning and clinical practice, essential for developing competent professionals. However, challenges such as staff shortages and limited resources hinder effective clinical teaching. Simulation-based education (SBE) offers a promising solution. This study aims to explore how SBE can enhance clinical teaching in Malawian nursing and midwifery education. Data were collected through in-depth interviews with lecturers, clinical instructors, and focus group discussion (FGD) with the final-year students. Thematic analysis revealed several key findings: SBE serves as a valuable gap-filler in clinical education, addressing complex needs while offering diverse learning opportunities. It also provides a platform for enhanced supervision and assessment strategies. The results indicate that SBE enables students to master various clinical skills without direct patient contact, reducing congestion at clinical sites while ensuring credit acquisition. Moreover, it proves effective as both a supervision and assessment tool for evaluating students' clinical performance. In conclusion, the study advocates for the integration of SBE into Malawian nursing and midwifery education to alleviate the challenges associated with traditional clinical teaching. By leveraging SBE, institutions can mitigate overcrowding at clinical sites and provide students with diverse learning experiences. However, successful implementation requires adequate infrastructure, resources, and skilled lecturers. Ultimately, SBE holds the potential to significantly enhance the quality and outcomes of nursing and midwifery education in Malawi.

1. Introduction

Nursing and midwifery are complex professions that require knowledge, affective attitudes, and psychomotor skills for safe professional practices and optimal patient outcomes [1]. The training of nurses and midwives in Malawi is organised in such a way that students are taught theoretical modules before they are exposed to aspects in clinical settings [2].

Students can choose to do a program that combines nursing and midwifery, or they can train as midwives or nurses separately. The transfer of theoretical knowledge into practice is a crucial part of preparing students for nursing and midwifery practice. This process is facilitated by clinical placement in various health facilities where students undergo clinical teaching and supervision [3]. The clinical aspects of nursing and midwifery training enable student

nurses and midwives to grow professionally by allowing them to put their theoretical knowledge into practice, thus applying theory to real-world situations [4]. The literature recommends that clinical instructors in health facilities teach or guide students during their clinical placement to achieve the necessary competencies [5].

During clinical placements, nurse/midwifery lecturers and clinical instructors are expected to collaborate to facilitate students' clinical learning experiences and development of clinical skills. According to the Nurses and Midwives Council of Malawi clinical guidelines, ten students are supposed to be supervised by one clinical instructor during clinical placement. However, with a large student population coupled with staff shortages, limited clinical sites, and material resources, it is not possible to effectively provide quality clinical support, as stipulated by the professional regulatory body. This compromises the quality and quantity of clinical teaching in Malawi [4]. Therefore, the clinical support and teaching of students by both academic and clinical staff is reported to be unsatisfactory [4].

Bø et al. [6] indicate that SBE is useful in the acquisition of nursing and midwifery skills in resource-limited countries. Other scholars have described SBE as an evidence-based pedagogical tool that is effective in the acquisition of clinical skills and thoroughly prepares students to train in a safe environment that is not hazardous to patient safety [7].

The Nurses and Midwives Council of Malawi developed SBE guidelines to improve the acquisition of skills by students in training institutions and health facilities. However, apart from the guidelines, there is limited literature on innovative teaching strategies in Malawi that can mitigate the challenges encountered in clinical teaching. Therefore, this study was conducted to explore how SBE can improve clinical teaching in nursing and midwifery education in Malawi.

2. Methodology

2.1. Design. This study used an exploratory descriptive qualitative design to explore how SBE can improve clinical teaching in nursing and midwifery education in Malawi. According to [8], an exploratory descriptive qualitative design is used when not much has been done in the area under study. In the current study, the design was considered appropriate because there is a paucity of literature on the use of SBE in relation to the clinical teaching of nurses and midwives in Malawi.

2.2. Study Population. The study population was comprised of the following:

- (i) Fourth-year nursing and midwifery students
- (ii) Lecturers in nursing and midwifery training institutions
- (iii) Clinical instructors in health facilities

2.3. Inclusion Criteria. The inclusion criteria include the following:

- (i) Nursing and midwifery students in the final year of their program and aged 18 years and above

- (ii) Clinical instructors and lecturers with more than six months of work experience in selected hospitals and training institutions, respectively

2.4. Exclusion Criteria. The exclusion criteria include the following:

- (i) Nursing and midwifery students aged below 18 years in years 2–4 of their programs
- (ii) Clinical instructors and lecturers with less than six months of work experience in selected hospitals and training institutions, respectively

2.5. Sampling Strategy. Purposive sampling was used to identify lecturers, clinical instructors, and final-year nursing and midwifery students who participated in this study. Purposive sampling is a method in which the researcher deliberately selects participants based on specific criteria [9]. Clinical instructors were approached by nursing officers responsible for different health facilities to meet the research team and provide consent for their participation in the study. Lecturers and students were recruited through the heads of the department and the office of the students' dean, respectively.

2.6. Data Collection. Data were collected through in-depth interviews and focus group discussion (FGD) which were audio-recorded with permission from the participants. FGD and in-depth interviews were conducted at the participants' institutions by appointment. The main focus of the FGD and in-depth interviews were the participants' knowledge about SBE problems being experienced in clinical teaching and how SBE can help to deal with some of the problems. Each FGD and in-depth interview lasted approximately 60 min and 45 min, respectively. Thirty-five in-depth interviews were conducted with 24 lecturers and 11 clinical instructors, using the same semistructured interview guide. A total of 90 final-year nursing and midwifery students participated in ten FGDs, with each group having between 8 and 10 participants (Table 1). All participants in the FGD thoroughly discussed each issue before moving to another issue to give all participants an opportunity to make their contributions.

This study was part of a larger study which focused on challenges encountered in clinical teaching in Malawi and gaps in the nursing and midwifery curricula in Malawi that could be filled using simulation. However, the focus of the current study was to explore feasible solutions to mitigate the challenges in clinical teaching and provide suggestions on how simulation could improve clinical teaching in Malawi.

2.7. Data Management. All audiotaped data were stored in soft copies on multiple computers before transcription to prevent data loss. The audiotaped raw data were then transcribed verbatim to prepare the information for analysis. Member checking was performed on ten conveniently selected study participants after transcription. This was done

TABLE 1: Proportion of study participants in relation to the population for each participant group.

Participant group	Total population	Sampled participants	Percentage
Students	639	90	14
Clinical instructors in health facilities	702	11	1.5
Lecturers	136	24	18
Total	1477	125	8

in order for the participants to verify the information that was collected from them.

2.8. Data Analysis. Data analysis was based on Clarke and Braun's [10] thematic analysis framework which has six steps. It was conducted by the principal investigator (PI) and a research assistant, who was a nurse midwife with vast experience in qualitative research methods. The PI and research assistant independently analysed the data from in-depth interviews and FGD. They began by familiarising themselves with the data by reading the transcripts to obtain a clear understanding of the data. In the process, the two identified words and phrases which appeared frequently in the transcripts and coded them as they were deemed to represent specific ideas. Coded words and phrases were later scrutinised and grouped according to their commonalities. Each group was given a heading which was considered as a tentative theme. The tentative themes were reviewed by two researchers, the principal investigator and research assistant, to identify the final themes, as indicated in Table 2.

2.9. Ethical Considerations. Ethical approval for this study was obtained from the College of Medicine Research and Ethics Committee (P.07/21/3362). In addition to ethical approval, permission to access the participants was obtained from responsible officials in the participating health facilities and training institutions. Verbal and written informed consent were obtained from each participant before the interview. To maintain the privacy of the participants, data were collected in designated institutional rooms. The researchers also ensured that the names of participants were not written in any research document and were not associated with any information that was collected from the respective participants. Participants had the right to withdraw from the study without any negative consequences.

3. Results

3.1. Participant Demographic Characteristics. Results show that 52 (57.7%) of the participants who took part in FGD were aged between 21 and 25 years, and 76.6% (69) were female. On the other hand, 40% (14) of the participants in the in-depth interviews were aged between 36 and 40 years, and 65.7% (23) of them were female (Table 2). In terms of qualifications, 48% (17) were holders of a bachelor of science, while in terms of work experience, 34.3% (12) of the participants had between 11 and 14 years of work experience and with some kind of previous experience with SBE at the time of the interviews.

TABLE 2: Participant demographic characteristics.

Age	Number of participants	Relative frequency (%)
<i>Participants for FGDs</i>		
18 years to 20 years	0	0
21 years to 25 years	52	57.7
26 years to 30 years	25	27.7
Above 30 years	13	14.3
Total	90	100
<i>Gender</i>		
Male	21	23.3
Female	69	76.6
Total	90	100
<i>Participants for in-depth interviews</i>		
<i>Age</i>		
25 years to 30 years	1	2.9
31 years to 35 years	3	8.6
36 years to 40 years	14	40.0
41 years to 45 years	10	28.6
46 years to 50 years	6	17.0
Above 50 years	1	2.9
Total	35	100
<i>Gender</i>		
Male	12	34.3
Female	23	65.7
Total	35	100
<i>Qualifications</i>		
BSc level	17	48.0
MSc level	14	40.0
PhD level	4	11.4
Total	35	100
<i>Work experience</i>		
6 months to 5 years	7	20.0
6 years to 10 years	8	22.9
11 years to 14 years	12	34.3
15 years to 19 years	6	17.1
Above 20 years	2	5.7
Total	35	100

3.2. Themes. Following a comprehensive analysis, which involved amalgamating data from individual interviews with those from FGD to establish unified descriptors, four primary themes and their corresponding subthemes emerged, as delineated in Table 3 and explained below. These themes and subthemes were elucidated through quotations extracted from FGD and in-depth interviews. Table 3 lists the themes that emerged from these data.

3.3. SBE as a "Gap-Filler". Participants indicated that SBE can help fill the gaps in clinical teaching. This theme emerged from the four subthemes listed in Table 2. Lecturers and clinical instructors explicitly elaborated that with SBE, an

overloaded curriculum would no longer be a challenge. They indicated that using scenarios and objectives in an SBE provides an opportunity to effectively cover several topics in one scenario. In addition, participants indicated that hospitals and other clinical sites would be relieved of the burden of high student numbers, as some of the activities would be performed at simulation sites.

“Simulation could be ideal in lightening the pressure of our overloaded curricula because we can cover so many topics with just one scenario. The good thing is that so many students can learn so many topics through one scenario; even if they are withdrawn from the clinical sites to work in the simulation centres or skills laboratory to ease the clinical congestion, the hours would still be counted by Nurses and Midwives Council of Malawi.” Senior Lecturer 5.

Clinical instructors indicated that working in teams with real patients is not always possible in a real clinical environment, where some trainee health professionals may decide to work independently of others. Therefore, they felt that SBE would help students from different professions and training institutions work in teams.

“The more students simulate, the more they develop multi-disciplinary skills, how to communicate and relate with other professionals, which is currently missing in our nursing and midwifery education. Simulation provides a more practical—hands-on experience of more skills in one scenario involving other professionals such as medical officers, dietitians, physiotherapists, radiologists even laboratory staff which is not possible with other teaching methods.” Clinical instructor 3.

Clinical instructors and lecturers acknowledge that there are knowledge and skill gaps, particularly for some clinical emergencies, conditions, and skills in clinical settings. This was confirmed by qualified nurses and midwives, who felt that SBE can significantly help expose students to conditions and emergencies that are rare in the clinical setting.

“Some qualified nurses/midwives have gone into practice without experiencing some conditions/skills in the college or clinical settings. Like some of us, we spent our entire college life without coming across procedures/skills like managing shoulder dystocia. With simulation, nurses and midwives can have a chance to practice and get oriented to these rare conditions or skills in teams or with a friend (mentorship) in the skills labs or simulation rooms.” Clinical instructor 6.

Several clinical instructors have noted that simulated patient-based education could potentially mitigate the language barrier they confront while engaging in teaching sessions with students or healthcare professionals from non-English-speaking countries. The role-playing that is done during simulation makes it easier for those who are not

proficient in English to understand what is happening through action.

“There are times when international students or health professionals from other French-speaking countries like Burundi, Congo come for clinical orientation in our health facilities through NCMC (the regulatory body) before being licensed to practice in Malawi; they do not fluently speak English, use of simulation could reduce language barrier if it is only reinforced...” Clinical instructor 3.

3.4. Needs in Clinical Teaching. The participants, mostly students, felt that there were some needs in clinical teaching which could be addressed by SBE. They highlighted the need to adopt innovative teaching strategies, lecturers, and clinical instructors to properly master nursing and midwifery skills. They suggested the adoption of innovative teaching strategies to improve students' acquisition of skills during clinical placement. They believed that SBE was an innovative strategy that could effectively assist students in integrating theory and practice.

“Clinical teaching remains a challenge in Malawi as it demands mastery of skills apart from having knowledge. Most lecturers as they grow professionally, they shun away from bedside care to office work because they may be deficient in some nursing and midwifery skills depending on how they were taught the skills; so they are good at knowledge not skills but with simulation that challenge can be reduced because it exposes nursing and midwifery students to a lot of practical activities which have the potential to greatly improve their nursing and midwifery skills.” Student 13.

Most students felt that frequent use of SBE would help lecturers and clinical instructors be fully equipped with theoretical knowledge that would help them properly guide students during SBE sessions. It would also help them master nursing and midwifery skills which could be an advantage for the students.

“They say practice makes things perfect and I think this can also be applied to teaching clinical skills by our lecturers. The more they teach using simulation, the more skills and knowledge they gain because they will be doing it now and again. So, I feel that in addition to us, as students gain the required skills using simulation, it is also time for our teachers to further sharpen their clinical skills and knowledge” Student 31.

3.5. Opportunities for SBE. Both lecturers and students felt that, during theory sessions in training institutions, students did not have adequate opportunities to practice in skills laboratories because of limited time and space. Therefore, participants suggested the establishment of SBE centres that could be accessible to students at any time in all training institutions.

TABLE 3: Themes and subthemes on how SBE can be used to improve clinical teaching in Malawi.

Themes	Subthemes
SBE—a gap-filler	(1) Lightening the pressure of an overloaded curriculum through the use of scenarios (2) Students working in teams using a multidisciplinary approach (3) Training rare clinical skills (4) Mitigating language barriers in teaching international students
Needs in clinical teaching	(1) Innovative teaching strategies (2) Mastery of nursing and midwifery skills for lecturers and clinical instructors
Opportunities for SBE	(1) Establishment of simulation corners in health facilities (2) Establishment of simulation centres in training institutions
Strengthened supervision and assessment strategy	(1) SBE for clinical supervision (2) SBE for clinical assessment

“In the case of our institution, we have over 1,500 students who would want to practice some skills in the skills laboratory which can only hold about 20 students at a time. . . makes it somehow difficult for all the students to use the laboratory. The time required for laboratory testing is also limited. If I was given an opportunity to advise management, I would say we need a purposefully built simulation centre which is well equipped and where students can practice skills at any time they want.” Lecturer 7.

According to the study participants, most health facilities do not have rooms where skills can be practiced before students start practising with real patients. The participants indicated that such rooms would help gauge students’ skills before they started dealing with patients. Therefore, they suggested that health facilities should provide special rooms for skill acquisition through SBE.

“During training, time for skills labs is not adequate. . . Simulation corners in health facilities can significantly help in skill acquisition. I have provided evidence through the two training sessions I attended on the SBE. Students in South Africa and Tanzania benefit from simulation corners situated within health facilities. Our students lack simulation corners for skills acquisition after theory block. . .it is a matter of liaising with hospital management to create space for skills acquisition within health facilities.” Senior Lecturer 2.

3.6. Strengthened Supervision and Assessment Strategy. This study found that SBE can be used as a strategy for the supervision and assessment of students’ clinical learning. The participants indicated that simulation can provide students with an opportunity to rehearse skills and recognise their weaknesses and strengths through feedback from colleagues. They further indicated that in all these, the clinical instructor or lecturer would be there to supervise a clinical activity and provide assistance where needed.

“With simulation, lecturers can supervise and assess our competencies concurrently as they provide feedback, while we evaluate ourselves on how we have performed to perfect our skills, current teaching methods miss on this.” Student 9.

This study found that SBE can be used to assess students’ knowledge and skills. The participants reported that a simulation session can give the clinical instructor or lecturer an idea about the students’ level of knowledge and skills, depending on their performance in a simulation session. Such an assessment would help make proper decisions about students to attain the expected clinical learning outcomes.

“Simulation is very effective in assessing and evaluating knowledge and skill acquisition. If students grasp the desired outcomes of a particular topic or skill, they will act in accordance with the given instructions and demonstrate their acquired knowledge or skills. In this way, lecturers can assess students. Students will also be able to self-assess their learning” Clinical instructor 1.

4. Discussion

The aim of this study was to explore how SBE can be used to improve clinical teaching in Malawi and to discuss the major findings of the study in relation to the available literature.

4.1. SBE and Gaps in Clinical Teaching in Malawi. The findings indicate that SBE helps fill the gaps in clinical teaching in Malawi. According to this study, such gaps are related to overloaded curricula, overcrowded clinical sites, working in teams, clinical teaching of rare skills and conditions, and language barriers. Pivač et al. [11] highlight that the use of scenarios in SBE helps teachers to cover more clinical skills and topics in a given time as opposed to the traditional ways of teaching skills. Similarly, a quasi-experimental study conducted in Tanzania asserted that a well-facilitated simulation provides learners with a wide range of high-quality experiences through a single scenario and promotes critical thinking, reasoning, and decision-making while also strengthening hands-on skills [12]. In addition, inadequate clinical sites, such as hospitals, make them overcrowded with students from various training institutions. Jacob et al. [13] conducted a study in Tanzania to gauge the perceptions of students about their clinical environment where it was found that among others, students had negative perceptions about their clinical environment because of congestion. Similar findings were reported in

South Africa by Fadana and Vember [14], who indicated that overcrowding reduces students' opportunities to practice with patients. On the other hand, Mbakaya et al. [15] argued that student overcrowding at clinical sites limits their acquisition of skills and competencies. In such situations, SBE would be an alternative to relieve such clinical sites of the pressure of having too many students.

In modern times, working in multidisciplinary or interprofessional teams is advocated [16, 17]. It is believed that simulations which involve trainees from different professions help students learn from one another, understand the roles of other professions, and perfect their skills in patient care [18]. Multidisciplinary teams would also help students improve their communication skills, interpersonal relationships, and leadership skills [19]. These skills can be transferred to the workplace, thereby enhancing patient care. Therefore, the use of SBE would help to bridge the interprofessional gap in the Malawian clinical setting where teamwork of students from different disciplines is lacking, according to the current study.

This study has shown that it is not always possible for students in a clinical setting to find certain clinical conditions on which they can practice [20]. In addition, a lack of knowledge and skills regarding uncommon conditions among students and healthcare workers could be a recipe for poor medical care [21]. Therefore, SBE fills the gap by providing students with scenarios which can mimic rare or uncommon conditions, situations, or unusual complications in the clinical setting. Such scenarios require students to make proper diagnoses and provide the right healthcare plan. Sanges et al. [22] developed an innovative approach which was successful in teaching rare diseases to medical students using role-play simulations.

The study findings have shown that SBE can fill a gap related to language and culture in clinical teaching in Malawi. While clinical teaching may focus on students' acquisition of critical skills and competencies related to their profession, it is very easy to ignore some skills which on the surface may not seem to be crucial on the surface. Nurses, midwives, and other healthcare providers may come into contact with clients from diverse language and cultural backgrounds which can present a problem in the provision of care due to the inability to understand clients [23]. As such, students in healthcare professions are supposed to be equipped with proper skills that would help them deal with clients who may have a different language and cultural background from their own. Therefore, SBE can be used to train healthcare students on how they can provide quality healthcare to culturally diverse groups of clients or clients with whom they do not share a common language [24].

4.2. Mastery of Both Knowledge and Skills. The study participants felt that the use of innovative teaching strategies, such as simulation, in nursing and midwifery education can help improve clinical teaching. This is in line with research conducted on obstetric neonatal emergency simulations in rural India by Zhong et al. [25], who recommended the use of simulation in the training of healthcare workers. Simulation is

an effective pedagogical approach that provides students with hands-on linkages between theory and practice [26], and thus helps them develop competency in nursing and midwifery. Studies have highlighted the value of simulations in the training of healthcare workers [27–29]. In a study that evaluated a simulation-based education program with final-year undergraduate nursing and midwifery students Plummer et al. [30] reported that the use of SBE improves students' decision-making skills, critical thinking skills, motivation, confidence, and experience in real-life practice. Similarly, a meta-synthesis about the appropriateness of SBE in the training of radiologists in South Africa, by Hazell et al. [31] found that simulation increased students' confidence.

The findings of this study highlight the significance of lecturers' and clinical instructors' mastery of knowledge and skills in improving clinical teaching. For clinical teaching to achieve the intended outcomes, lecturers and clinical instructors should have the appropriate knowledge and skills which should be imparted to students. Hill [32] attests that role-playing in an obstetric emergency can be challenging for both lecturers and students, because of the complexity and urgency of the situation. Such challenging situations require professionals who are knowledgeable and skilled. Several studies have reported that SBE is a good strategy for teaching and fostering the development and acquisition of knowledge and skills [6, 33, 34]. This implies that formal SBE training for all lecturers and clinical instructors in all training institutions and settings should be emphasised.

4.3. SBE Infrastructure. Both lecturers and students in the current study felt that, during theory, students did not have adequate time to practice skills in training institutions, and even during clinical allocation, the students did not adequately assist in sharpening their skills and improving their nursing and midwifery competencies before they started assisting patients. Most health facilities and training institutions do not have infrastructure in which skills can be practiced before and during clinical placements. These findings resonate with Toale et al. [35], who further opine that one way in which SBE can facilitate clinical teaching is through the establishment of simulation corners within health facilities which can provide students with ample time to master their clinical skills. Studies have shown that SBE can be conducted in actual clinical settings in designated rooms to provide students with the opportunity to practice clinical skills and increase their proficiency in both technical and nontechnical skills [36, 37].

4.4. SBE as a Supervision and Clinical Assessment Strategy. The study participants alluded to the fact that SBE is a good strategy for supervising students' clinical activities and assessing how well they are performing in the activities. The purpose of clinical supervision in the training of nurses, midwives, and other health professionals is to help students develop as professionals in their respective training fields [38]. According to Bifarin and Stonehouse [39], clinical supervision is a process in which students who are doing clinical work are properly supported by teachers and other

clinical instructors to attain and improve the skills necessary for their profession. The use of SBE in student supervision helps students gain a deeper understanding of issues and concepts and improves their problem-solving and decision-making skills through scaffolding [20].

Supervision and assessment in education go hand in hand, although their aims differ [40]. While supervision mostly focuses on supporting, coaching, and facilitating student learning, assessment is mainly concerned with making judgments about student learning and achievement of certain milestones or objectives. Ryall et al. [41] conducted a systematic review to examine the use of simulation for assessment of technical skills in health professional education where it was found that simulation-based clinical assessments can be used to evaluate students' performance and skills acquisition. In addition, Koster and Soffler [42] highlighted that because of other assessment barriers in the real clinical environment, simulations are becoming a valuable means for assessing students' competences and skills. In the case of Malawi, one of the barriers that could reduce students' opportunities to be assessed in an authentic clinical situation, as highlighted elsewhere, could be the congestion of students at clinical sites. In a study conducted in Canada to investigate simulation utilisation and evaluation practices and approaches among undergraduate nursing educational programs, Zitzelsberger et al. [43] indicated that participants reported that simulation was a valuable strategy for the evaluation of students' learning and performance. Therefore, with careful planning, clinical assessment using simulations in Malawi can become a reliable way of making judgments about students' clinical learning.

In conclusion, SBE is a possible solution to some of the challenges encountered in clinical teaching in Malawi. Despite the many challenges posed by clinical teaching, SBE is consistently believed to mitigate these challenges and add value to clinical teaching through improvements in knowledge and skill acquisition. This study suggests that simulation centres and corners should be established in all training institutions and health facilities to provide lecturers and students with ample time to bolster their clinical skills, thereby improving the quality of patient care.

4.5. Study Limitations. This study was mostly conducted in training institutions and health facilities where researchers constantly interacted with the study participants. To some extent, some of the collected data may have been influenced by this prior interaction. However, the involvement of other training institutions not affiliated with researchers' institutions has remedied this limitation. Furthermore, some data collectors had no prior interaction with the participants. Second, this study presents the perspectives of the lecturers, clinical instructors, and students. This was a limitation in terms of adequately and properly amalgamating the themes from all three groups of participants. However, analysis of the data by experienced people ensured that the analysis was performed with great care to capture views from all groups of participants.

Data Availability

The data used to support the findings of this study are included within the article.

Disclosure

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policies or positions of any affiliated agency. This article expands on the research presented at the 15th International Conference on Education and New Learning Technologies held on 3–5 July, 2023, in Palma, Spain.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

G.M., P.M., A.M., and M.M. contributed to the conceptualisation and design of the work, data collection, data analysis and interpretation, drafting of the article, and critical revision of the article. E.C.F., K.H., IT, and B.B. critically revised the article. All authors have contributed to the final version of the manuscript.

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Review Article

Systematic Review and Psychometric Properties Analysis of First-, Middle-, and Top-Level Nurse Manager's Core Competencies Instruments

Lucia Filomeno ¹, Daniela Forte ¹, Emanuele Di Simone ², Marco Di Muzio ²,
Daniela Tartaglino ³, Marzia Lommi ¹, and Dhurata Ivziku ⁴

¹Department of Biomedicine and Prevention, Tor Vergata University of Rome, Via Cracovia, 50 00133 Rome, Italy

²Department of Clinical and Molecular Medicine, Sapienza University of Rome, Via Giorgio Nicola Papanicolau, 00189 Roma RM, Italy

³Head of Healthcare Professions Department, Fondazione Policlinico Universitario Campus Bio-Medico, Via Alvaro del Portillo, 200 00128 Rome, Italy

⁴Healthcare Professions Department, Fondazione Policlinico Universitario Campus Bio-Medico, Via Alvaro del Portillo, 200, 00128 Rome, Italy

Correspondence should be addressed to Emanuele Di Simone; emanuele.disimone@uniroma1.it

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Purpose. Healthcare organisations need to define the role of the nurse manager in light of recent global health developments. For this purpose, several core competencies essential for each hierarchical management level need to be assessed. Different measurement instruments have been developed to assess nurse managers' competencies. This systematic review summarises the characteristics and psychometric properties of existing instruments measuring first-, middle-, and top-level nurse managers' competencies. **Methods.** Following PRISMA guidelines for reporting and Consensus-based Standards for the selection of health Measurement INstruments (COSMIN) guidelines, 789 articles were retrieved from PubMed, Scopus, CINAHL, and APA PsycINFO databases with no time limitation. The review protocol was registered on PROSPERO (CRD42023425854). **Results.** Ten tools were identified, assessing one or more competencies among nurse managers: Competency Elements for Nurse Managers of Tertiary General Hospitals, NICA-NL, HCCI, I-FLNMMCS, NMCI, Chase Nurse Manager Competency Questionnaire, CASHN, Questionnaire for Head Nurses' Managerial Competencies, Nurse Manager EBP Competency Scale, and the Home Healthcare Nurse Manager Assessment Tool. **Conclusion.** Following the COSMIN assessment, the Chase Nurse Manager Competency Instrument was the most comprehensive among the included instruments, and the CASHN questionnaire scored highest on methodological quality and level of evidence. These instruments can be used in clinical practice to evaluate competencies and as a basis for developing managerial training courses.

1. Introduction

The literature extensively discusses the concept of competence, but notable discrepancies in its definition hinder consensus. This lack of clarity often arises from using specific frameworks across diverse contexts and disciplines, revealing significant disparities in the interpretation and application of key terms related to competence and

understanding of their interrelation. European Directive 2006/962/EC suggested exploring competencies linked to specific disciplines for a better understanding. One of the earliest and widely used definitions by Hamel and Prahalad [1] characterizes competence as the intersection of knowledge, skills, attitudes, and values, mobilized to address diverse situations. This perspective recognizes the intricate interplay between competence and other aspects that

contribute to performance. Clinical psychologist Robert White defines competence as a fundamental human effort motivating individuals, asserting that competence and activities fostering it lead to inspirational pathways to success [2].

Several interpretative approaches view competence as a function of the context in which it is applied, where “worker and work form one entity through the lived experience of work” [3]. Within this framework, competencies go beyond learned contents/concepts, imposing a profound reorganisation of acquired knowledge and relative transfer in the labour market. Moreover, it is essential to consider that discipline-specific competencies represented only 30% of the entire cluster of competencies, while the remaining 70% were expected to have a wide range of specialisations [4].

In healthcare management, certain competencies, such as planning and managing resources or supporting teamwork and communication, are common to other specialisations. In contrast, nursing-specific competencies have become the subject of study in more recent research over the last ten years and were approached from various perspectives. For example, Chase [5] identified competencies such as technical, human, conceptual, and leadership and organised quality care services. On the other hand, the American Organization of Nurse Leaders has identified competencies such as the ability to create and maintain good relationships, communication, leadership, knowledge of the healthcare environment and clinical principles, professionalism, business skills, and strategic leadership as key areas in developing competencies [6, 7].

Effective management competencies constitute the cornerstone of success and efficiency in healthcare organisations. Competent nurse management fosters the quality of patient care and contributes to favourable employee morale and engagement, reducing turnover rates and cultivating a positive workplace culture [8, 9]. According to a systematic review, competencies such as planning, communication, and leadership are associated with enhanced patient satisfaction, increased nurses’ job satisfaction, and reduced occurrences of patient mortality, prescription mistakes, restraint usage, and hospital-acquired infections [8].

Different levels of healthcare organisational management and governance require distinct competencies for effective role application in this scenario. Top-level nurse managers (NMs) engage in higher-level planning, such as mission and strategy, which require more excellent conceptual skills [10]. Middle-level NMs deal with specific processes to deliver value, necessitating technical skills to manage their area of specialisation [11, 12].

First-level NMs are leaders of units in hospitals or other medical settings. Their role does not include regular interaction with patients. Instead, they influence the quality of healthcare by leading the work and helping to ensure that the medical facility operates smoothly [13, 14].

Competence-related conceptual models combine skills, abilities, and knowledge encompassing specific behaviours that an individual exhibits. Competencies are typically categorised into three main types, as described by Robert L. Katz, who developed a framework to explain managerial

competencies [15]. In his 3 Skills Taxonomy, he set out the following categories:

- (i) Conceptual, as the formulation of ideas. Managers understand the importance of relationships, developing ideas, and problem-solving.
- (ii) Human involves the ability to interact with people. Managers interact and cooperate with employees, patients, and superiors.
- (iii) Technical involves knowledge and proficiency in managing processes. Managers use specific tools for one particular area.

Dreyfus [16] identified five stages of progress in competencies: novice, advanced beginner, competent, proficient, and expert. Their model assumes that the longer one practices, the more competent one becomes at a job or task. Acquisition of competencies is a matter of experience; each stage requires time and practice.

Regarding more nursing-specific concept models, a scoping review conducted by González-García et al. [17] identified 22 competencies grouped into six dimensions: management, communication and technology, leadership and teamwork, knowledge of the health system, nursing knowledge, and personality. Based on that, the same authors created a nurse executive competency model (MCGE-executive level) to define the executive nurse’s position, expected level of performance, and development required. It is composed of 51 competencies, tracking progress in each from “competent” to “expert” [10].

The current research in nursing and management endeavours to delineate essential competencies required for nurse managers, stratifying them based on the level of management. The absence of a comprehensive description of competencies and how they manifest at different managerial levels poses a challenge in effectively measuring the enrolment and evaluation of nurse managers. There is a pressing need for an instrument capable of measuring nurse manager competencies across various hierarchical levels, facilitating our understanding of the nuanced application of these competencies in real-world healthcare settings. In order to identify appropriate instruments to measure NMs’ competencies, this study summarises existing instruments for assessing and evaluating core competencies of first-, middle-, and top-level nurse managers.

2. Methods

A systematic review was carried out to examine existing instruments assessing the core competencies of nurse managers according to CONsensus-based Standards for the selection of health Measurement INSTRUMENTS (COSMIN) guidelines [18]. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist was used to describe the study selection process [19]. The COSMIN guidelines were used for the quality assessment of the included articles.

The review protocol was registered on PROSPERO with ID record no. CRD42023425854.

2.1. Search Strategy. A search was performed on the following four online bibliographic databases: PubMed, CINAHL, Scopus, and APA PsycINFO. Search terms were based on a COSMIN search filter to identify studies of psychometric properties, combined with terms relevant to nurse manager competencies. Table 1 summarises the search strategy used and the main terms included. We also hand-searched the reference lists of articles identified for inclusion in the review to uncover additional relevant studies.

To guide the synthesis of selected articles, Robert L. Katz's framework [15] was used as a methodological approach to organise the results and discover patterns and commonalities. The research team chose this specific framework because, to date, it is the most referred to from studies conducted in this area of interest.

The selection of studies was carried out from database inception to March 30th, 2023.

The PICO (population, instruments, construct, and outcomes) was formulated as follows:

- (i) P: nurse managers at every hierarchical level
- (ii) I: instruments assessing core competencies through validation studies and psychometric measurements testing
- (iii) C: instruments' constructing the building process
- (iv) O: to establish a level of recommendation based on measurement properties

2.2. Inclusion and Exclusion Criteria. The inclusion criteria were as follows: (i) development and validation studies of instruments assessing NMs competencies (at every level: first, middle, and top management and in different settings); (ii) grey literature such as dissertations (only doctoral); (iii) published peer-reviewed studies; and (iv) articles written in English and Italian. No time limitation was applied.

The exclusion criteria were as follows: (i) qualitative and quantitative studies that did not have as their main goal the development, psychometric testing, and validation of a new scale for managerial competencies (e.g., surveys, cross-sectional or phenomenological design, protocols, or reviews); (ii) studies that tested the developed instrument on core competencies of managers in nursing samples; (iii) studies that did not publish the instrument in the paper; or whose instruments were not in English. The researchers contacted the authors of such scales to ask for the instrument and/or its availability in English. The study was excluded if no answers were received or if the instrument was not available in English.

To provide a comprehensive and up-to-date overview, we decided to report in this study only the most recent version or modification of an instrument that has been validated. However, when evaluating quality, we also considered previous validation publications. Of these, cross-cultural validation studies and those that presented limited and/or insufficient validation data (e.g., only Cronbach's alpha and no exploratory factor analysis) were excluded.

2.3. Data Extraction and Synthesis. Two researchers (LF and DI) independently screened the titles and abstracts of the articles identified by the search strategy. Disagreements about inclusion or exclusion were resolved by consulting a third researcher (EDS), who is a supervisor or senior member of the team who has major knowledge and experience on the topic. Articles that potentially met our inclusion criteria but whose supporting information was insufficient for inclusion were retrieved.

In the final phase, interresearcher agreement on inclusion and exclusion was calculated as Cohen's kappa. The scores of the two independent researchers were compiled and compared. The agreement coefficient was $\kappa=0.67$ (86.7%), indicating a substantial agreement [20].

In accordance with the COSMIN manual for systematic reviews of PROMs [21], data were synthesised reporting the following:

- (i) The characteristics of the included PROMs, such as the name of the PROMs, reference to the article in which the development of the PROM is described, constructs being measured, language and study population for which the PROM was developed, the intended context of use, the available language version of the PROM, number of scales or subscales, number of items, response options, recall period, interpretability aspects, and feasibility aspects;
- (ii) The characteristics of the included study population;
- (iii) The methodological quality ratings of each study per measurement property;
- (iv) A Summary of Findings' (SoF) table per measurement property.

2.4. Quality Appraisal. Three independent researchers (LF, DI, EDS, and ML) assessed included studies' methodological quality and psychometric properties under the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) checklists [21].

First, the researchers evaluated each instrument development study and content validity against ten quality criteria defined in the COSMIN checklist. An overall rating for instrument development and content validity was determined based on the quality and results of the available studies. For each instrument, the researchers summarised the results as sufficient (+), insufficient (-), inconsistent (\pm), or indeterminate (?) and classified the quality of the evidence as high, moderate, low, or very low, using a modified GRADE approach based on the risk of bias (quality of the studies), inconsistency (of the results of the studies), and indirectness (evidence comes from different populations, interventions, or outcomes from those of interest in the review) [18].

Second, researchers evaluated the instruments' construct validity, reliability, and responsiveness. The COSMIN checklist assesses whether a study meets the standards for good methodological quality on a four-point rating scale (very good, adequate, doubtful, inadequate), classifying the

TABLE 1: Literature search terms.

Database	Search terms	Number of articles ($n = 789$)
PubMed CINAHL	("assess*" [all fields] OR ("evalua*" [all fields])) AND "competenc*" [all fields] AND "nurse administrator" [MeSH terms] OR "nurse" [all fields] AND "nurse administrator*" [all fields] OR ("nurs*" [all fields] AND "manager" [all fields]) OR "nurse manage*" [all fields] OR ("nurse lead*" [Journal] AND ("coordinat*" [all fields] OR ("nurse administrat*" [MeSH terms] AND "executive*" [all fields]) OR "nurse executive" [all fields])) AND "tool" [all fields] OR "instrument*" [all fields] OR ("scale*" [all fields] AND "measure*" [all fields]) OR "inventor*" [all fields] OR "questionnaire*" [all fields] OR ("survey" [all fields])	351 249
Scopus	TITLE-ABS-KEY ((assessment OR evaluation OR monitoring) AND (competenc* AND (nurse AND manager OR nurse AND leader OR nurse AND coordinator OR nurse AND executive OR nurse AND administrator) AND (tool OR instrument OR scale OR inventory OR questionnaire))	81
APA PsycINFO	((any field: assessment OR any field: evaluation OR any field: monitoring) AND (any field: competenc*) AND (any field: nurse AND any field: manager OR any field: nurse AND any field: leader OR any field: nurse AND any field: coordinator OR any field: nurse AND any field: executive OR any field: nurse AND any field: administrator) AND (any field: tool OR any field: instrument OR any field: scale OR any field: inventory OR any field: questionnaire))	108

psychometric properties as sufficient (+), insufficient (-), or indeterminate (?) and assigning a quality of evidence as high, moderate, low, and very low.

Finally, an overall recommendation is made using the grading of recommendations assessment, development, and evaluation (GRADE) approach, assigning level A of recommendation for use in higher-quality studies, level B for studies potentially recommended but in need of further testing, and level C for studies not recommended for use. Level B is assigned when the scale cannot be classified as level A or C.

3. Results and Discussions

Overall, 789 publications were retrieved from the electronic databases. After removing duplicates and studies that did not fulfil the inclusion criteria, the authors were left with 10 studies included in the review that were eligible for methodological quality assessment.

The PRISMA flow chart of study selection is presented in Figure 1.

3.1. Characteristics of Included Studies and Instruments. Overall, 10 studies were included in the review. The studies were conducted in different countries: USA (6), Iran (1), China (1), Thailand (1), and Indonesia (1). A detailed information on studies is summarised in Table 2.

The studies targeted competencies of different nurse managerial categories such as *supervisors*, *directors*, *head nurses*, *chief nurses*, and others. In some studies, a clear division of managers into first-level, middle-level, and top-level categories was presented, specifying the sample size for each category [22–26], whereas in other studies, the sample was described in an aggregated form [5, 27–29].

All reviewed studies were conducted in main hospital settings except for two that were conducted in a tertiary general hospital [22] and in a home healthcare nursing agency [26]. The instruments were self-reporting with

structured response options of 3- to 5-point Likert scales. The number of items ranged from 16 [25] to 93 items [29], and the instruments were tested on samples of managers ranging from 30 to 614 persons.

3.2. Psychometric Properties and Methodological Quality of Instruments. The quality of evidence and the psychometric properties of the development and validation studies of the instruments are presented in Table 3.

Overall, one study was of high quality [28], 8 instruments [5, 22, 23, 25–30] presented moderate quality of evidence in the content validity, and one was of low quality [24].

The most common areas of bias were instrument development procedures (doubtful qualitative methodology for finding relevant items; doubt over the presence of any trained moderator/interviewer; lack of interview guidance in the article; a doubtful process of recording/transcribing participant's responses; doubt over the independence of the data decoding process; and doubt whether data saturation was reached).

In pilot tests, bias was assigned to doubtful relevance, completeness, or clarity of items to the respondent and to the low numbers of participants enrolled in the pilot test/expert panel.

Regarding the construct's psychometric properties, one study [28] presented high quality on internal consistency and structural validity, 4 studies [5, 22, 29, 30] presented moderate quality, 4 studies [24–27] were of low quality, and 1 study [26] was of very low quality. Low scores for structural validity were given when the sample size used in the analysis was inadequate (adequate rating = at least 5x and ≥ 100 , or 6x and < 100).

Overall, five instruments were given a GRADE A rating [25, 27–30], and five instruments a GRADE B rating [5, 22–24, 26] because, in most of them, the sample size did not satisfy the requirement of at least 5 times the number of items and ≥ 100 or at least 6 times the number of items but < 100 .

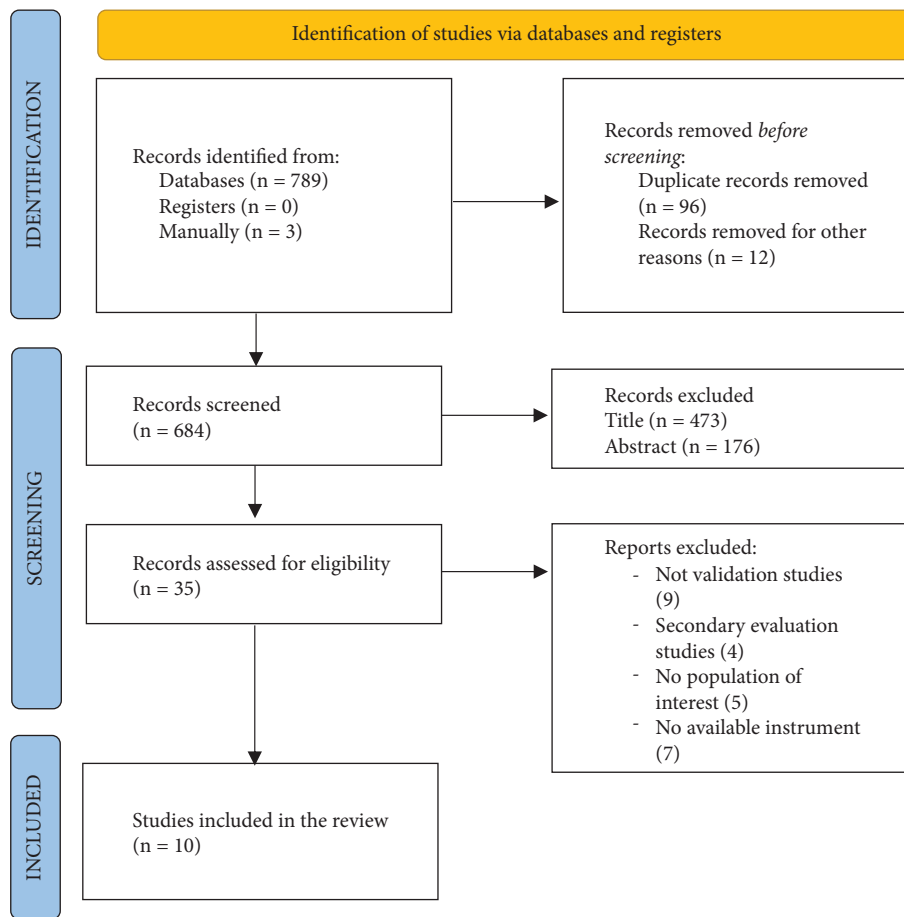


FIGURE 1: PRISMA 2020 flow diagram [19].

3.3. *Instruments Descriptions According to Quality Level and Managerial Domains Explored.* The instruments included in this review varied in the complexity of the competencies explored. Some scales included 17 domains of competencies, whereas others included only 4. The details are presented in Table 4. Four scales [5, 27, 28, 30] explored the greatest number of competencies.

Some competencies were commonly included in more than 6 instruments, including staff advocacy and development, team communication and collaboration, time management, quality improvement, leadership, problem-solving, and evidence-based practice. However, other competencies, such as organisational and policy overview or negotiation, were mentioned only by single instruments [5, 27].

(i) Nurse Manager Competency Inventory (NMCI).

The NMCI measures competencies in building cohesive teams by fostering a collaborative and supportive environment [25]. This scale explored the following job competency domains: staff retention, staff recruitment, staff development, performing supervisory responsibilities, quality care, conducting daily unit operations, fiscal planning, communication, quality improvement, promoting a professional practice model, and developing self.

Cronbach's α was calculated and reported only for item-total correlations, giving a "moderate" quality of evidence (QoE) in content validity and "low" QoE in structural and construct validity and internal consistency. Only this study measured responsiveness data before and after intervention with effect size. The respondent's role by itself accounted for only 2-3% of the total overall variance. The measurement properties quality (MPQ) was "sufficient." This resulted in a GRADE A level of recommendation.

(ii) The Human Capital Competencies Inventory (HCCI) for nurse managers.

The HCCI is a self-assessment instrument for measuring NMs' competencies in managing human capital [24]. Content validity testing ($N=3$ and $CVI=1.0$, for all retained items) and internal consistency reliability ($N=99$; Cronbach's $\alpha=0.84-0.89$) yielded 58 activities in five subscales: developing self, recruiting, developing others, utilising, and retaining.

This development study was not performed in a sample representing the target population, resulting in a "low" QoE in every psychometric property measured. Moreover, reviewers evaluated

TABLE 2: Characteristics and measurement properties of the competency assessment instruments.

Authors, year, country	Instrument/structure	Sample	Validity	Reliability
Wang et al., 2022 China [22]	Competency Elements for Nurse Managers of Tertiary General Hospitals-Chinese 22 items 5-point Likert scale 4 domains: Leadership and management ability, personal traits, professional quality, and professional ability	$n = 518$ Nurse managers: (i) Junior = 37 (ii) Middle = 316 (iii) Subsenior = 148 (iv) Senior = 17	<i>Content validity:</i> ECVI (expected cross-validity index) = 3.314 <i>Face validity:</i> pilot test on 136 subjects <i>Structural validity:</i> PCA with varimax rotation: 4 factors explaining 62.21% of the variance	<i>Internal consistency:</i> Cronbach's $\alpha = 0.745-0.885$
Collins et al., 2017 USA [23]	NICA-NL-English 26 items 5-point Likert scale 6 domains: strategic implementation, advanced information and education, executive planning, ethical and legal concepts, information systems concepts, and requirements and system selection	$n = 357$ (i) Nurse manager = 74 (ii) Director = 103 (iii) Chief nursing officer = 38 (iv) Other = 142	<i>Content validity:</i> CVI = 0.96-1 <i>Face validity:</i> 3-round Delphi study on 101 subjects <i>Structural validity:</i> PAF with promax rotation: 6-factors	<i>Internal consistency:</i> Cronbach's $\alpha = 0.81-0.96$
Chase, 2010 USA [5]	Chase Nurse Manager Competency Instrument-English 53 items 4-point Likert scale 5 domains: constructs, technical, human, conceptual, leadership, and financial management	$n = 81$ American Organization of Nurse Executives (AONE) members	<i>Content and face validity:</i> a panel of 53 experts <i>Structural validity:</i> PCA with varimax rotation: 5 factors explaining 57.2% of the variance	<i>Internal consistency:</i> Cronbach's $\alpha = 0.909$ <i>Test-retest:</i> 2 weeks apart with 23 NMs ($r = 0.88$)
Donaher et al., 2007 USA [24]	HCCI-English 61 items 4-point Likert scale 5 domains: developing self, recruiting, developing others, utilising, and retaining	$n = 99$ (i) First-line = 53 (ii) Middle = 45	<i>Content validity:</i> CVI = 1.0 <i>Face validity:</i> a panel of 4 experts <i>Structural validity:</i> PCA with promax rotation: 3 factors explaining 68.87% of the variance	<i>Internal consistency:</i> Cronbach's $\alpha = 0.84-0.89$
Gunawan et al., 2019 Indonesia [25]	I-FLNMMCS-Indonesian and English 43 items 5-point Likert scale 7 domains: leadership, facilitating spiritual nursing care, self-management, staffing and professional development, informatics, financial management, and applying quality care improvement	$n = 300$ first-line	<i>Content validity:</i> CVI = 0.859 <i>Face validity:</i> a panel of 7 experts and a pilot test on 17 subjects <i>Structural validity:</i> PCA with varimax rotation: 7 factors explaining 51.37% of the variance <i>Cross-cultural validity:</i> forward-backward translation method (CVI from 0.83 to 1) <i>Hypothesis testing:</i> ($r = 0.321-0.687$)	<i>Internal consistency:</i> Cronbach's $\alpha = 0.955$
DeOnna, 2006 USA [26]	NMCI-English 93 items 5-point Likert scale 11 domains: promotes staff retention and recruitment, facilitates staff development, performs supervisory responsibilities, ensures patient safety and quality care, conducts daily unit operations, manages fiscal planning, facilitates interpersonal, group, and organisational communication, leads quality improvement initiatives, promotes professional practice model, and develops self	$n = 527$ (i) First-line = 309 (ii) Middle = 159 (iii) Executive = 48	<i>Content validity:</i> CVI = 1.0 <i>Face validity:</i> a panel of 7 experts <i>Structural validity:</i> PCA: 3 factors explained 68.87% of the variance	<i>Internal consistency:</i> Cronbach's $\alpha = 0.96$

TABLE 2: Continued.

Authors, year, country	Instrument/structure	Sample	Validity	Reliability
Moghaddam et al., 2019 Iran [27]	Questionnaire for Head Nurses' Managerial Competencies-Iranian 78 items 5-point Likert scale 4 domains: planning, organising, leadership, and control	<i>n</i> = 30 head nurses	Content validity: CVI = 0.7–0.79 Face validity: 2-round Delphi study on 16 experts and a pilot test on 30 subjects	Internal consistency: Cronbach's α = 0.93
Tongmuangtunyatep et al., 2015 Thailandia [28]	CASHN-Thaiandese 52 items 5-point Likert scale 5 domains: leadership, healthcare environment management, policy implementation and communication, management, and professional ethics	<i>n</i> = 614 head nurses	Content validity: CVI = 0.94 Face validity: a panel of 6 experts and a pilot test on 30 subjects Structural validity: PCA with oblique rotation: 3 factors explained \geq 60% of the variance	Internal consistency: Cronbach's α = 0.93–0.96
Shuman et al., 2017 USA [29]	Nurse Manager EBP Competency Scale-English 16 items 3-point Likert scale The total score is calculated by summing scores for all 16 items and then dividing by 16 2 domains: EBP knowledge and EBP activity	<i>n</i> = 83 nurse managers	Face validity: a panel of 8 experts and a pilot test on 4 subjects Structural validity: PAF with promax rotation: 2-factors	Internal consistency: Cronbach's α = 0.95
Rosenfeld et al., 2012 USA [30]	Home Healthcare Nurse Manager Assessment Tool-English 38 items 5-point BARS scale 5 domains: leadership, problem-solving, planning and organisation, coaching, and aligning performance for success	<i>n</i> = 57 supervisors (i) 31 directors (ii) 9 administrators (iii) 8 managers (iv) 9 others <i>n</i> = 154 (i) 123 manager (ii) 17 coordinators (iii) 10 specialists (iv) 4 others	Face validity: pilot test Structural validity: PCA with varimax rotation: 5 factors explained 66.9% of the variance	Internal consistency: Cronbach's α = 0.866–0.948

NICA-NL, Nursing Informatics Competency Assessment for the Nurse Leader; NMCCQ, Nursing Manager Communication Competency Questionnaire; NMLMC, Nurse Managers Leadership and Management Competencies Scale; HCCI, Human Capital Competencies Inventory; I-FLNMMCS, Indonesian First-Line Nurse Managers' Managerial Competence Scale; LaMI, Leadership and Management Inventory; NMCI, Chase Nurse Manager Competency Instrument; CASHN, Competency Assessment Scale for Head Nurses.

TABLE 3: The methodological quality of psychometric properties and level of evidence of included studies.

Authors (no. of reference)	Relevance	Comprehensiveness	Comprehensibility	Overall content validity	Structural validity	Internal consistency	Reliability	Construct validity	Recommendation
Wang et al., 2022 [22]	-/M	-/M	+/M	+/M	-/M	+/M	?/M		B
Collins et al., 2017 [23]	+/M	+/M	+/M	?/M	-/L	?/L			B
Chase, 2010 [5]	+/M	+/M	+/M	+/M	-/M	+/M	+/M	+/M	B
Donaher et al., 2007 [24]	+/L	-/L	?/L	-/L	-/L	+/L		+/L	B
Gunawan et al., 2019 [25]	+/M	+/M	+/M	+/M	-/M	+/M			A
DeOnna, 2006 [26]	+/M	+/M	+/M	+/M	-/L	+/L		+/L	A
Moghaddam et al., 2019 [27]	+/M	+/M	+/M	+/M	-/L	+/L	+/L		A
Tongmuangtunyatep et al., 2015 [28]	+/H	+/H	+/H	+/H	+/H	+/H		+/H	A
Shuman et al., 2017 [29]	+/M	+/M	+/M	+/M	?/M	+/M			A
Rosenfeld et al., 2012 [30]	-/M	+/M	+/M	+/M	-/VL	?/VL	+/VL		B

Methodological quality of the study measurement properties was rated as follows: + = sufficient; - = insufficient; ? = indeterminate. Quality of evidence was rated as follows: H = high; M = moderate; L = low; and VL = very low.

TABLE 4: Domains associated with each instrument.

Categories	Wang et al., 2022	Yen et al., 2017	Chase, 2010	Donaher et al., 2007	Gunawan et al., 2019	DeOnna, 2006	Moghaddam et al., 2019	Tongmuangtunyatep et al., 2015	Shuman et al., 2017	Rosenfeld et al., 2012	F
Staff advocacy and development	•		•	•	•	•		•		•	7
Team communication and collaboration	•		•			•	•	•		•	6
Change and resource management		•	•				•	•	•		5
Quality care and patient safety	•		•		•	•		•			5
Personal mastery and self-development	•			•	•	•					5
Staff retention and recruitment			•	•		•			•		4
Performing supervisory responsibilities	•			•		•		•			4
Time management		•	•	•		•	•			•	6
Quality improvement		•	•	•	•	•	•	•	•		6
Promoting professional model		•	•			•	•				3
Group management			•	•		•	•	•			4
Achievement orientation	•		•	•			•			•	5
Organizational and political view			•								1
Leadership	•		•	•				•		•	6
Informatics		•	•		•						3
Financial management			•		•						2
Ethical and legal concepts		•	•		•			•			4
Negotiation							•				1
Evidence-based practice	•		•	•	•	•	•	•	•	•	6
Problem-solving	•		•	•	•	•	•	•	•	•	6
F*	8	4	17	8	10	9	11	11	5	6	

F* = frequency of appearance.

how the items were worded and whether the response options matched the question as “undetermined.” Therefore, the MPQ for content validity was “insufficient,” as was the structural validity. Internal consistency and construct validity were rated as “sufficient” because Cronbach’s alpha was calculated for each unidimensional subscale separately, and an adequate description of the important characteristics of the subgroups was provided. The inventory was finally given a GRADE B.

- (iii) Chase Nurse Manager Competency Instrument.
- The authors used the five domains of Katz’s conceptual framework (technical, human, conceptual, financial, and leadership), confirmed by a PCA. Test-retest reliability was conducted by administering the same test twice, at a two-week interval, to a group of 23 NMs ($r=0.88$). With regard to comparing tools, Chase [5] was the only researcher who could compare his latest scale version with the first one developed in 1994.
- The Chase Nurse Manager Competency Instrument was the only one validated in other languages (Hebrew and Slovenian) by other authors [31, 32]. Experts produced the translations independently and performed multiple forward and backward translations. Still, no numerous group factor analysis or differential item functioning (DIF) analysis was reported as COSMIN guidelines recommend.
- These results allowed the reviewers to rate all properties as “moderate.” A “sufficient” QoE was given to all measurements except for structural validity (inadequate sample size). The instrument was finally assigned a GRADE B.
- (iv) Home Healthcare Nurse Manager Assessment Tool.
- The tool developed by Rosenfeld et al. [26] focused on home healthcare nurse managers’ competencies, comprised of five domains: leadership, problem-solving, planning and organisation, coaching, and aligning performance for success, tested with a PCA with varimax rotation explaining 66.9% of the variance. Cronbach’s alpha for each subscale ranged from 0.866 to 0.948 and weighted kappa from 0.58 to 0.86.
- The tool scored “moderate” QoE except for structural validity, internal consistency, and reliability, where it scored “very low.” Reviewers gave these scores because of inadequate sample size, the absence of any clear description of the construct, and the lack of a qualitative method to assess comprehensibility. This tool was allotted a GRADE B recommendation.
- (v) Competency Assessment Scale for Head Nurses (CASHN).

The CASHN tool was developed by Tongmuang-tunyatep et al. [28] to evaluate head nurses’ competencies in community hospitals. The final version comprised five factors: leadership, healthcare environment management, policy implementation and communication, management, and professional ethics.

The CASHN presented an I-CVI ranging from 0.83 to 1.00, and the S-CVI was 0.94. The internal consistency reliability ranged from 0.93 to 0.96.

This scale was the only one that scored “high” and “sufficient” in every measurement property, reaching a GRADE A. Therefore, we highly recommend this instrument for future cultural validation studies.

- (vi) Nursing Informatics Competency Assessment for the Nurse Leader (NICA-NL).
- The NICA-NL instrument was specifically developed to assess a set of informatics competencies relevant to NMs [26].
- The scale comprised 26 items and six domains: strategic implementation, advanced information and education, executive planning, ethical and legal concepts, information systems concepts, and requirements and system selection.
- Cronbach’s alpha ranged from 0.81 to 0.96.
- This scale scored “low” for structural validity and internal consistency. Only EFA was performed, and the sample size included in the analysis was inadequate. Neither qualitative nor quantitative methods to assess comprehensibility were described. The final GRADE was B.
- (vii) Nurse Manager EBP Competency Scale.
- Shuman et al. [29] developed an entire instrument focused on measuring NMs competencies regarding EBP consisting of 16 items and two domains: EBP knowledge and EBP activity. The subscales demonstrated reliabilities of 0.90 (95% CI = 0.87 and 0.93) and 0.94 (95% CI = 0.92 and 0.96), respectively. Cronbach’s alpha for the entire scale was 0.95.
- This scale was rated “moderate” and “sufficient” in all the psychometric properties except for “indeterminate” in structural validity due to inconsistent sample size. The scale has a GRADE A of recommendation.
- (viii) Questionnaire for Head Nurses’ Managerial Competencies.
- Moghaddam et al. [27] initially developed a competency model to provide a valid tool for assessing the managerial competencies of hospital department head nurses. This tool measured 27 competencies categorised by four main managerial tasks: planning, organising, leadership, and control (Cronbach’s alpha = 0.93; ICC = 0.89).

Results revealed that the study population gave the highest priority to strategic thinking (0.122) and the lowest to evidence-based decision-making (0.007).

The questionnaire scored “sufficient” for the methodological quality of each assessed property. Internal consistency and reliability were rated as “low” because statistics were not calculated for each unidimensional subscale separately, and the time interval (recall period) for face validity was not clearly stated. The scale reached a GRADE A level of recommendation.

(ix) Indonesian First-Line Nurse Managers’ Managerial Competence Scale-I (FLNMMCS).

This study developed a practical, 43-item instrument (I-FLNMMCS) with 7 domains: leadership, facilitating spiritual nursing care, self-management, staffing and professional development, informatics, financial management, and applying quality care improvement to evaluate the managerial competence of Indonesian FLNMs (Cronbach’s $\alpha = 0.955$; CVI = 0.859; $r = 0.321-0.687$) [30].

The scale underwent a forward-backward translation method from Indonesian to English (CVI from 0.83 to 1).

The scale achieved “moderate” QoE and adequate methodological quality for the measured properties, resulting in GRADE A.

(x) Competency Elements for Nurse Managers of Tertiary General Hospitals.

This study examined the NM competency model of tertiary general hospitals in China [22]. The instrument consists of 22 competencies and four dimensions: leadership and management ability, personal traits, professional quality, and professional ability, and includes elements of proper staffing/scheduling, hiring/recruiting, developing staff competencies, role-modelling, retaining staff, and coaching/mentoring professionals (Cronbach’s $\alpha = 0.745-0.885$; KMO = 0.928).

The reviewers rated all the psychometric properties as “moderate,” with some differences for the QoE. Relevance and comprehensiveness were rated as “insufficient” because the origin of the construct was not clear (a theory, conceptual framework, disease model, or clear rationale provided to define the construct to be measured), and it was doubtful whether skilled interviewers were used for concept elicitation. Structural validity was also “insufficient” because only EFA was performed. The final GRADE was B.

3.4. Discussions. This systematic review aimed to summarise the characteristics and psychometric properties of existing instruments measuring first-, middle-, and top-level nurse managers’ competencies. The review evidenced that some instruments explored a broad range of competencies,

addressing core competencies and major themes such as change and resource issues, leadership and management, teamwork and communication, finance, informatics, and technology. Other instruments explored at a deeper level single competencies such as the EBP competency scale [29] and the NICA-NL tool for informatics [23]. Furthermore, among the included instruments, only the Chase Nurse Manager Competency Instrument was validated in other languages, delineating the need for further testing of the other instruments explored in this review.

The first instrument that measured the competencies of nurse managers was developed in 2006; most of them were developed during the last 17 years. This suggests that the study of competencies among NMs is still in its infancy and needs further exploration.

Scales developed more recently showed better quality in psychometric properties than previous ones due to the continuous updating of statistical techniques and the broader range of support literature compared to past years.

Management competencies are context-sensitive and influenced by the complexity of the sector, teams, and organisations in which these competencies must be demonstrated. Hence, most of the domains encountered in this review regarding this specific sector can also be commonly found in different nonhealthcare realities such as commercial banks [33], marketing [34], and the military [35]. As also demonstrated in the studies that consider a generic population of middle managers, not strictly related to the healthcare sector, communication, organisation, information searching, analytical thinking, and planning skills are typical yet required for good public middle managers. Achievement orientation, leadership, directiveness, persuasiveness, and creativity are qualities that separate good public middle managers from mediocre performance. Furthermore, some other new competencies obtained inductively through a thematic analysis are important for effective public managers: adherence to laws and regulations, multistakeholder collaboration, and technical competencies [36, 37].

Some domains overlapped across scales, while others with the same terminology included different skills. The number of domains (factors) varied between scales, from a minimum of 2 to a maximum of 11.

Learning from previous studies, the individual’s educational and work background significantly impact developing competencies, representing a possible bias during the assessment [38]. However, having been a nurse manager does not adequately equip them for the vast range of abilities required, necessitating specialised training and practical work experience [39].

Regarding the COSMIN evaluation of the instrument quality, various critical aspects were identified that could potentially lead to ambiguous or unclear outcomes. For example, in 7 out of 10 studies, the sample size was below the recommended level based on the number of items included in the instrument. Also, insufficient attention was given to formulating an appropriate hypothesis regarding the expected correlations between competencies and the identified comparators, or the correlations needed proper

confirmation [40, 41]. While exploratory factor analysis (EFA) was conducted to test scale dimensionality, confirmatory factor analysis (CFA) was performed in only a few studies before using the measurement instrument for research [42]. In two studies, Cronbach's alpha was calculated for the full scale instead of being calculated for each dimension in multidimensional instruments [43]. Addressing these methodological gaps is crucial for enhancing the validity and reliability of future studies employing these instruments. By summarizing the findings of this review, we can say that the study of competencies among NMs is still in its infancy and needs further exploration.

3.4.1. Recommendation GRADE A. Despite criticism regarding weak structural validity, five instruments received a GRADE A recommendation. The studies of DeOnna [25], Tongmuangtunyatep et al. [28], Shuman et al. [29], Gunawan et al. [30], and Moghaddam et al. [27] exhibited satisfactory methodological quality in most of the measurement properties, and the quality of evidence ranged from low to high. In accordance with the COSMIN guidelines, these instruments are recommended for clinical practice use.

The NMCI questionnaire [25] received a positive assessment, but it exhibited deficiencies in some properties due to the lack of clarity in the stated method for data analysis. Nevertheless, it could serve as a foundation for sequencing competencies to develop an Middle Nurse Manager (MNM) orientation and career path program. The CASHN instrument scored highest in most of the measurement properties evaluated, with satisfactory methodological quality and high evidence level. Nurse executives can use this scale to plan the development of integrity and awareness of regulatory requirements for head nurses and to develop effective educational programs [28].

The Nurse Manager EBP Competency scale [29] can be used in complex and dynamic practice settings, explaining variations in implementing and sustaining EBP. An MNM's full competency in evidence-based management (EBM) may contribute to effectiveness in promoting good quality care. More research is needed on the reasons for and barriers to EBP implementation.

The I-FLNMMCS tool [30] can be used as a basis for FLNMs to improve their competence levels and as a vehicle for feedback mechanism; however, despite all psychometric properties being rated as sufficient and of moderate quality, structural validity was deemed insufficient due to an inadequate sample size.

Finally, the Questionnaire for Head Nurses' Managerial Competencies [27] was designed based on a proposed framework that included four main managerial tasks: planning, organising, leadership, and control. It showed limited evidence of structural validity: the sample size included in the analysis was inadequate [44]. Consistent with the findings of this study, a previous study conducted by Pillay [45] affirmed that head nurses should have strategic planning skills to set the vision, mission, goals, objectives, and strategies.

3.4.2. Recommendation GRADE B. None of the included instruments received a GRADE C recommendation; however, five of them were categorised as GRADE B. The HCCI tool by Donaher et al. [24], the Home Healthcare Nurse Manager Assessment Tool [26], the Competency Elements for Nurse Managers of Tertiary General Hospitals by Wang et al. [22], the NICA-NL instrument developed by Yen et al. [42], and the Chase Nurse Manager Competency Instrument [5] received a GRADE B, primarily due to insufficient structural validity resulting from a small sample size. Notably, the NICA-NL instrument [42] distinguished itself as the sole tool specifically addressing informatics competencies. Validating these competencies equips nurse managers to personally contribute, rather than delegate, digital competencies to interprofessional initiatives, thereby fostering optimal and supportive care environments [23]. The Chase Nurse Manager Competency Instrument [5] holds the distinction of being the most widely used tool. The identified methodological gaps in these instruments underscore the necessity for additional testing to strengthen the validity and reliability of future studies employing these tools.

Thus, this systematic review of instruments measuring competencies among nurse managers confirms that management competencies can be broadly categorised as generic or specific to a particular profession [4]. Many competency domains encountered in the instruments included in the review are also commonly found in nonhealthcare sectors such as commercial banks [33], marketing [34], and the military [35], emphasizing the versatility of these competencies. Commonalities exist in competence domains such as communication, organisation, information searching, analytical thinking, and planning competencies [40]. Moreover, specific competencies such as adherence to laws and regulations, multistakeholder collaboration, and technical skills are important for managers in the healthcare sector [36, 37]. In addition, distinct levels of healthcare organisational management require varying competencies, including achievement orientation, leadership, directiveness, persuasiveness, and creativity [40]. These qualities are crucial for effective performance among top-middle managers in the healthcare sector, differentiating between good and mediocre performance in this context [40]. The interplay of educational and professional background further influences the development of competence and performance levels [38, 39]. Therefore, this comprehensive review lightens the multifaceted nature of management competencies among nurse managers, highlighting their relevance to the healthcare sector and underscoring the crucial need for specialised training in developing competencies for effective healthcare organisational management.

When designing new instruments, efforts should be made to standardize the instrument development process. Scale development and measurement property validation can be carried out by utilising standardized development techniques or the COSMIN guidelines. When developing scale items, the expert consultation approach should be supplemented with additional qualitative research methods, such as in-depth interviews and focus group discussions, to extensively investigate patients' viewpoints from different

perspectives. Scale creation and measurement property evaluation should be guided by item response theory, classical measurement theory, and other relevant theories. In addition, a recall period should be established during scale creation to offer a useful reference for measuring scale responsiveness and to assure consistency and accuracy in the assessment.

3.5. Strengths and Limitations. The strength of this study lies in the methodological rigor applied to instrument evaluation and the resulting recommendation for the use of instruments with high quality. Researchers selected the COSMIN checklist, known for its rigorous assessment of methodological quality in reviewed studies, to fortify the methodology of this systematic review on measurement properties. Adhering to the PRISMA guidelines, two researchers independently ensured a standardized and coherent data selection process. The methodological quality of the included studies was individually assessed by reviewers, and a consensus was reached on the rating scores. A notable strength of this study lies in its objective to encompass available instruments measuring the competencies of nurse managers across various levels and the inclusion of diverse settings for evaluating the phenomena on a broad scale. All ten reviewed studies were conducted in heterogeneous public and private settings such as hospitals, primary care, home-based care, and acute and chronic care. This comprehensive approach spanned countries across four continents, enhancing the study's global relevance and applicability.

However, certain limitations need to be taken into account.

The search was limited to four databases, including English and Italian language studies. This may have excluded relevant studies written in other languages and indexed in other databases.

In addition, as measurement properties were extracted from published articles, the limited space available in journals could have restricted the reporting of instrument validation, affecting methodological quality assessment.

Since the COSMIN criteria for assessing the methodological quality of instrument measurement properties are highly detailed and rigorous, an instrument rated as poor or indeterminate could still be valid or reliable. The quality of reporting and the design of the validation studies should be improved by using, for example, COSMIN quality criteria as guidelines.

3.6. Implications and Recommendations. As already known, high-level nurse management competencies influence healthcare quality and relative outcomes. The results of this study could be significant for shaping the design of competency-based academic and training programs for nurse managers as well as for the development of competency assessment tools, performance appraisal tools, and staff recruitment strategies.

The results of this study may be used to design the professional roles of nurse managers, and to improve the leadership and management skills. Another remark is that

nurse managers' research and development competencies still need to be improved since they have a crucial role in developing nursing care, despite the fact that their roles have evolved and become less clinical in some nations. Therefore, nursing personnel consider this role to be one of their most important contacts for communicating concerns and patient care requirements.

Although existing instruments may comprehend some of the fundamental domains, they do not set out to capture all elements of nurse management competence that may be important to consider. Indeed, a significant degree of heterogeneity was found in the definition of competency, and different synonyms were used for the domains studied and the competencies included in each of them, making it challenging to compare scales and their assessment methods. Therefore, future studies should try to unify competency descriptions and interpretations to achieve consistency and a common language between countries.

We recommend advancing the study of the aforementioned instruments by contextualising them in other settings and countries. In addition, defining a cut-off point on the scales to assess the level of achievement and comparing it over repeated intervals can further enhance our understanding of specific knowledge and competence in nursing management.

4. Conclusions

This review aims to provide a meaningful understanding of existing instruments for measuring and evaluating the core competencies of first-, middle-, and top-level nurse managers.

Due to limited or unknown evidence about some measurement properties, the identified instruments should be used cautiously in clinical practice because of their variations.

Exactly half of the selected instruments were divided between GRADE A (Nurse Manager EBP Competency Scale, NMCI, CASHN, I-FLNMMCS, and Questionnaire for Head Nurses' Managerial Competencies) and B (HCCI, Chase Nurse Manager Competency Instrument, and Home Healthcare Nurse Manager Assessment Tool, NICA-NL, and Competency Elements for Nurse Managers of Tertiary General Hospitals) recommendations.

The difference between one level and the other lay in the accuracy and depth of the methodology chosen to validate the instrument, especially due to the inadequacy of the sample size.

Some competencies were commonly explored among instruments, including staff advocacy and development, team communication and cooperation, time management, quality improvement, leadership, problem resolution, and evidence-based practice. Other competencies, such as organisational and policy overview or negotiation, were less addressed.

The CASHN tool was the one with the highest score in both methodological quality and GRADE of evidence. The Chase Nurse Manager Competency Instrument was the one that included the most competencies.

Future research should focus on developing scales by using a more rigorous methodology, considering well-accepted theories to assess the different dimensions of management-related competencies and creating an inclusive definition for managerial competencies.

We also suggest completing the validation procedures started for both newly constructed and previously developed instruments but with higher-quality techniques and estimation of all psychometric features.

Data Availability

No data were used to support the study.

Additional Points

What is Already Known? High-level nurse management competencies influence healthcare quality and help achieve organisational goals. Existing instruments do not include all elements of competence that may be important to measure. *What This Paper Adds?* The CASHN tool (Competency Assessment Scale for Head Nurses) is the most recommended and effective methodological instrument for evaluating the competencies of nurse managers. A more rigorous methodology should be employed to conduct psychometric validation for both newly constructed and previously developed nurse manager competence instruments.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Review Article

A Systematic Review of Economic Evaluations in Clinical Nursing Practices

Yushan Guan ¹, Nan Ru ¹, Ruifu Kang ¹, Xiangping Jia ¹, Tingting Xu ²,
and Zhaolin Meng ¹

¹School of Nursing, Capital Medical University, Beijing, China

²Department of Health Policy and Management, Capital Medical University, Beijing, China

Correspondence should be addressed to Zhaolin Meng; mengzhaolin@ccmu.edu.cn

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Background. The misallocation of scarce healthcare resources globally raises concerns regarding the underuse of high-value care and the overuse of low-value care. Economic evaluations can help policy makers determine whether an intervention presents a better value for money and desirable clinical benefits, thus realizing value-based care. **Aim.** We aimed to conduct a systematic review of the economic evaluations of clinical nursing practices to advance knowledge on value-based care. **Methods.** A systematic review was conducted using MEDLINE, Embase, Web of Science, Cochrane Central Register of Controlled Trials, CINAHL, NHS Economic Evaluation Database, Health Technology Assessment, and Tufts CEA Registry for full economic evaluations of clinical nursing practices from January 2013 to January 2023. Outcomes were incremental cost-effectiveness ratios, incremental cost-utility ratios, incremental cost-benefit ratios, incremental net benefit, and the differences in costs for cost-minimization studies. Methodological quality was evaluated using the Consensus Health Economic Criteria-extended checklist. Results were synthesized using permutation matrices for all studies. The protocol was registered with PROSPERO (CRD42023415918). **Results.** Thirty-five studies were included in this review, with 27 studies categorized as good methodological quality and 8 as moderate quality. Clinical nursing practices were dominant (i.e., more effective and less costly) in 19 studies, potentially cost-effective depending on willingness-to-pay thresholds in 15 studies, and were dominated (i.e., less effective and more costly) in 1 study. **Conclusion.** Our study advanced knowledge on value-based care for clinical nursing practices. Results suggest that most clinical nursing practices studied may be clearly economically favourable or potentially favourable. **Implications for Nursing Management.** The results of this review provide valuable insights into value-based care in nursing and facilitate the decision-making of healthcare policymakers regarding health resource allocation to achieve value-based care.

1. Introduction

Since nursing care represents a significant proportion of healthcare expenditures, there are substantial opportunities for nurses to contribute to and lead efforts in cost reduction and healthcare improvement [1, 2]. Compared to the economic value of clinical practices provided by medical specialists, less attention is paid to the economic value of clinical nursing practices [2]. Clinical nursing practices were defined as clinical interventions, programs, or approaches to care that were delivered by or ordered by nurses, or led by nurses, within the scopes of registered nurse practice or advanced practice nursing [1]. The research that examines the

economic value of clinical nursing practices can inform nurse decision-makers, seeking to allocate limited financial resources efficiently and effectively, thus eventually contributing to the realization of value-based care.

Value-based care is defined as a framework for optimizing health and well-being per unit of expenditure [3]. When patients do not receive care that is highly likely to improve the quality or quantity of life, which represents good value for money, the phenomenon is commonly referred to as underuse of high-value clinical practice. Conversely, when patients receive care in which evidence suggests its potential harm exceeds the potential benefit or the additional costs do not provide proportional added

benefits, it is commonly referred to as overuse of low-value clinical practice [3, 4]. It has been estimated that approximately 30% of healthcare spending is on low-value clinical practice, which wastes limited resources and may threaten the sustainability of the healthcare system [2, 5].

To achieve value-based care, both the underuse of high-value clinical practice and the overuse of low-value clinical practice should be focused on, with supportive evidence from economic evaluations [6]. Economic evaluation is the comparative analysis of alternative courses of action in terms of both their costs and consequences, which can help determine whether clinical practices present a better value for money and desirable use of healthcare [7, 8]. There are four types of full economic evaluations: cost-effectiveness analysis (CEA), cost-utility analysis (CUA), cost-benefit analysis (CBA), and cost-minimization analysis (CMA), which differ in the way consequences are measured. CEA measures consequences in natural (health) units, such as life years gained, whereas CUA measures outcomes in a single unit of measurement, such as quality-adjusted life year (QALY). CBA measures consequences in monetary terms, which can directly express whether the benefits outweigh the costs. CMA is a method of comparing different alternatives that use comparisons of costs when benefits have shown to be equivalent [8].

Earlier efforts to summarize the evidence on economic evaluations of clinical nursing practices are limited. One previous review evaluated and described the quantity and quality of economic evaluations in nursing-relevant research conducted in the United States (USA) between 1997 and 2015 [1]. However, to the best of the authors' knowledge, no comprehensive systematic review of economic evaluations in the field of nursing has been conducted to identify both low- and high-value clinical nursing practices. Our study aimed to conduct a systematic review of the economic value of clinical nursing practices to advance knowledge of value-based care. The results of this review can facilitate the decision-making of healthcare policymakers regarding health resource allocation to achieve value-based care.

2. Methods

2.1. Design. We followed the guideline recommendations for conducting systematic reviews of economic evaluations for informing evidence-based healthcare decisions [9–11], and all findings were reported according to the updated version of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines [12]. The protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO CRD42023415918).

2.2. Inclusion and Exclusion Criteria. We included full economic evaluations (cost-effectiveness, cost-utility, cost-benefit, and cost-minimization analyses) of clinical nursing practices. Both trial-based and model-based economic evaluations were included. Clinical nursing practices were defined as clinical interventions, programs, or approaches to

care that were delivered by or ordered by nurses, or included nurses, within the scopes of registered nurse practice or advanced practice nursing [1]. We restricted the review to studies published in English from January 2013 to January 2023 to ensure its feasibility and timeliness of the results. In addition, we considered studies identifying the economic evaluation results wherein one clinical practice being dominant or dominated by the alternative.

We excluded studies of practices provided by other healthcare professionals or nursing procedures that require an order from other healthcare professionals such as medication prescribing or requests for lab testing by physicians. We also excluded research protocols, conference abstracts, editorials, letters to editor, and narrative reviews.

2.3. Search Strategy and Study Selection. An extensive literature search was conducted in MEDLINE (via Ovid), Embase, National Health Services Economic Evaluation Database (NHS EED), Health Technology Assessment (HTA) Database, Cochrane Central Register of Controlled Trials (via Ovid), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, and the Tufts Cost-Effectiveness Analysis Registry (<https://www.cearegistry.org>). The full search strategies for each database are presented in Appendix 1. Furthermore, reference lists of included studies and studies cited in previous reviews were also screened to identify additional studies.

All citations were exported to EndNote (version X8) in which the duplications were eliminated. A screening web tool system, RAYYAN (<https://rayyan.ai/>), was then used for the screening process. To ensure reliability, sets of 200 citations were independently evaluated and then discussed by the reviewers until acceptable agreement was achieved during study selection. Two reviewers (YSG and RFK) then independently screened all identified records using titles and abstracts. All abstracts that could potentially apply to the inclusion criteria were forwarded to full-text review. Any disagreement was resolved through discussion between reviewers and, if necessary, consultation with a third reviewer (ZLM).

2.4. Data Extraction. An electronic data extraction form was developed, with a detailed instruction manual and piloted on a representative sample of 10 publications. Pairs of reviewers (YSG and ZLM) independently extracted the following information from eligible studies: country, intervention and comparator, study design (single study-based and model-based), type of economic evaluation, population, perspective, threshold, cost categories, outcomes, and cost-effectiveness results (incremental cost-effectiveness ratio (ICER), incremental cost-utility ratio (ICUR), incremental cost-benefit ratio, incremental net benefit, and the difference in costs for cost-minimization studies). Any conflict was resolved through consensus. In cases of disagreement, a third reviewer (TTX) with content expertise in economic evaluation was consulted. The corresponding authors were contacted by emails to obtain additional information when necessary.

2.5. Quality of Methodology Assessment. Two reviewers independently assessed the methodological quality for each included study using the recommended approach, the Consensus Health Economic Criteria (CHEC)–extended checklist (Appendix 2) [13, 14]. This 20-item checklist can appraise model-based or trial-based studies, with positive responses scored 1 and negative responses scored 0 [10]. The total score for each item was summed and converted to a percentage with the final scores ranging from zero to 100 (final score = (total score/20) × 100%). The total CHEC score for each study was categorized into four grades based on cutoff values: low (≤ 50), moderate (51–75), good (76–95), and excellent (>95) [15]. Higher scores indicate higher quality. We also presented the results in a graph using RevMan 5.3 software.

2.6. Data Synthesis and Analysis. Meta-analyses were not performed due to the heterogeneity of the costing methods and the interventions, in line with Cochrane guidelines [16]. Instead, a narrative synthesis of the findings from included studies was presented. We used a permutation matrix summarizing results according to nine possible outcomes of cost (higher, same, and lower) and effectiveness (higher, same, and lower), which was adapted from the systematic review of economic evaluation guidelines developed by Joanna Briggs Institute [17]. Costs were converted to 2024 international dollars (Int.\$) using a web-based tool [18]. For studies that did not report the reference year, an assumption of base year prior to the publication date was made as the base year. For cost-utility studies, we used a willingness-to-pay threshold of \$50 000 per QALY gained to assist in interpreting the results [19]. Our goal was to be as broad as possible to assist the readership with the interpretation of results in line with their settings so we did not consider applicability or transferability to specific settings in the synthesis methods.

3. Results

3.1. Results of the Search. The initial search identified 10,313 studies. After excluding duplicate studies, 6,534 records remained for title and abstract screening. Of these, 96 were eligible for full-text assessment. After the full-text screening, 35 studies were included in the systematic review. The study selection process is summarized in Figure 1. Sixty-one full-text articles were excluded because they did not meet the “full economic evaluation” criteria ($n = 13$), were not primary studies reporting results of an economic evaluation (e.g., protocols) ($n = 7$), or did not target clinical nursing practices ($n = 41$) (see Appendix 3).

3.2. Characteristics of Included Studies. The characteristics of included studies are shown in Table 1. Among the 35 included articles, 28 studies were conducted in high-income countries: the United Kingdom ($n = 6$), Australia ($n = 5$), the United States ($n = 5$), Canada ($n = 2$), Germany ($n = 2$), Sweden ($n = 1$), Denmark ($n = 1$), the Netherlands ($n = 1$), Italy ($n = 1$), Ireland ($n = 1$), Japan ($n = 1$), Korea ($n = 1$),

and multicountry ($n = 1$). Seven studies were conducted in low- and middle-income countries (LMICs): China ($n = 3$), Brazil ($n = 3$), and Turkey ($n = 1$). Eighteen studies were published between 2018 and 2022 and 17 studies between 2013 and 2017. A total of 16 studies were single study-based economic evaluations and 19 were model-based economic evaluations. Most studies ($n = 23$) performed a cost-effectiveness analysis, 15 performed a cost-utility analysis, and four performed a cost-benefit analysis (five of these performed both a cost-effectiveness and a cost-utility analysis; two of these performed both a cost-effectiveness and a cost-benefit analysis). The majority of studies were conducted in hospital settings ($n = 29$), while six studies were conducted in primary care settings. Sixteen economic evaluations were conducted from a healthcare system perspective, eight from a societal perspective, and five from a payer perspective (two of which were conducted from both a healthcare system and societal perspective). The perspective was not reported in eight studies. A total of 18 economic evaluation studies assessed the cost-effectiveness of treatment practices, and 17 studies assessed prevention practices. Targeted economic evaluations of treatment practices included wound care ($n = 4$) [20–23], urinary catheterisation care ($n = 1$) [24], intravenous therapy ($n = 3$) [25–27], medication administration ($n = 1$) [28], pressure ulcer management ($n = 1$) [29], peristomal skin care ($n = 1$) [30], oxygen therapy ($n = 1$) [31], pulse oximetry monitoring ($n = 1$) [32], nutrition management ($n = 1$) [33], nasogastric tube placement ($n = 1$) [34], immobile patient care ($n = 1$) [35], respiratory rate monitoring ($n = 1$) [36], and doula care ($n = 1$) [37]. Targeted economic evaluations of prevention practices included pressure ulcer prevention ($n = 9$) [38–46], catheter-associated urinary tract infection prevention ($n = 2$) [47, 48], central venous catheter-related infection prevention ($n = 1$) [49], medication error prevention ($n = 1$) [50], fall prevention ($n = 2$) [51, 52], delirium prevention ($n = 1$) [53], and aspiration prevention ($n = 1$) [54].

3.3. Methodological Quality of Included Studies. Table 2 and Appendix 4 summarize the results of the risk of bias assessment of the included studies, as indicated by the percentage score. Each item was scored as 1 if the study met the requirement or 0 if it did not meet or only partially met the requirement. Moreover, “not applicable” (NA) was noted and was scored as 1 if the assessed item was not relevant to the study. The quality of all studies ranged from 60% to 95%. A total of 27 studies [20, 21, 23, 25–32, 34–38, 41, 42, 44–49, 51, 52, 54] were categorized as good quality, eight [22, 24, 33, 39, 40, 43, 50, 53] as moderate quality, and no study as low quality. Two items, model description (item 5) and generalizability (item 18), had the lowest scores. Of the 19 model-based studies, 13 (68.4%) did not report the structural assumptions and the validation methods of the model. Regarding generalizability, 21 studies (60.0%) did not discuss the generalizability of their results to other settings and populations. Other methodological shortcomings included the following: 12 studies (34.2%) did not state the ethical issue (item 20), nine studies (25.7%) did not identify all relevant costs (item 8), nine studies (25.7%) did not describe

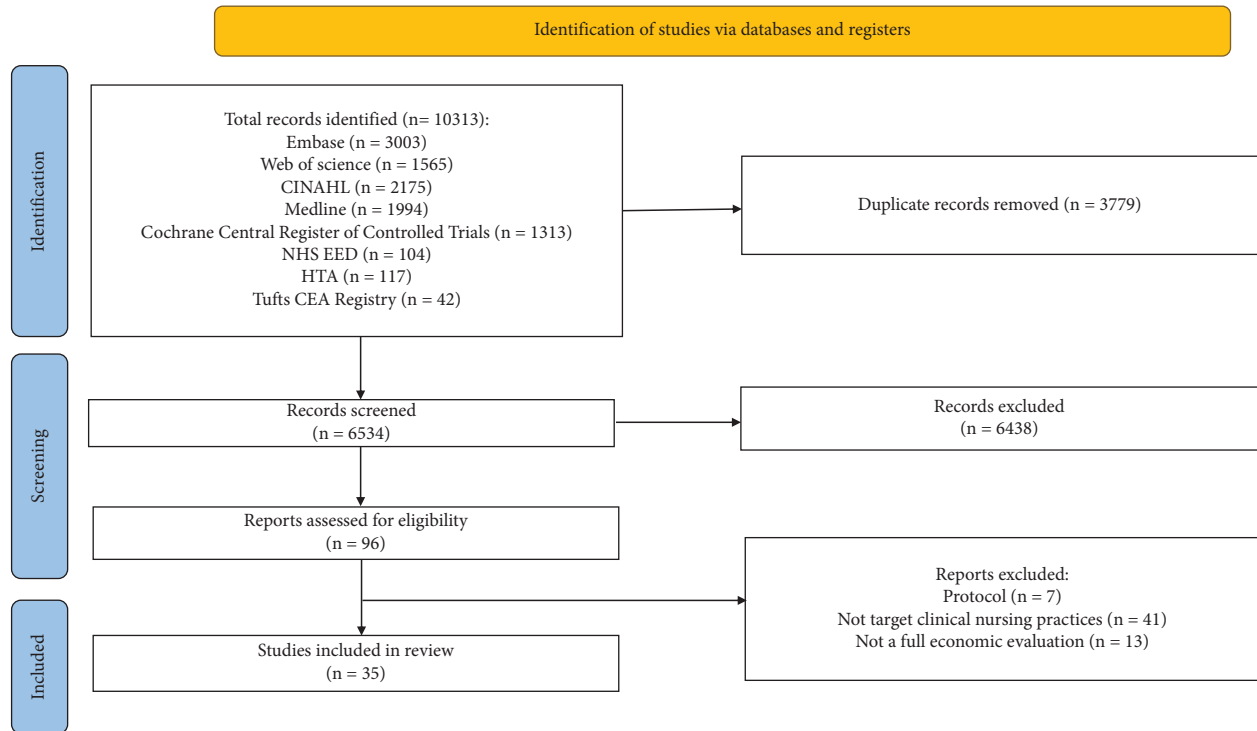


FIGURE 1: PRISMA flowchart of the study selection process. Note: PRISMA indicates Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

TABLE 1: Overview of included studies ($N = 35$).

Characteristics	n (%)
<i>Country</i>	
UK	6 (17.1)
Australia	5 (14.3)
USA	5 (14.3)
China	3 (8.6)
Brazil	3 (8.6)
Canada	2 (5.7)
Germany	2 (5.7)
Multicountry (USA and Australia)	1 (2.8)
Others	8 (22.9)
<i>Year of publication</i>	
2013–2017	17 (48.6)
2018–2022	18 (51.4)
<i>Study design</i>	
Single study-based	16 (45.7)
Model-based	19 (54.3)
<i>Types of economic evaluation</i>	
Cost-effectiveness analysis	16 (45.7)
Cost-utility analysis	10 (28.6)
Cost-benefit analysis	2 (5.7)
Cost-utility and cost-effectiveness analyses	5 (14.3)
Cost-effectiveness and cost-benefit analyses	2 (5.7)
<i>Setting of economic evaluation</i>	
Hospital setting	29 (82.9)
Primary care setting	6 (17.1)
<i>Perspective</i>	
Healthcare system	14 (40.0)
Societal	6 (17.1)
Payer	5 (14.3)

TABLE 1: Continued.

Characteristics	n (%)
Societal and healthcare system	2 (5.7)
Not stated	8 (22.9)
<i>Types of clinical nursing practices</i>	
Treatment practices	18 (51.4)
Prevention practices	17 (48.6)

the population characteristics in detail (item 1), eight studies (22.9%) did not state the study perspective (item 7), and seven studies (20.0%) did not perform uncertainty analyses (item 16).

3.4. Results of Economic Evaluations. The results of the economic evaluations are presented in Table 3, Figure 2, and Appendix 5. Out of 35 economic evaluations, the intervention group was dominant (more effective and less costly when compared with the control) in 19 studies (Table 3, Figure 2, and Appendix 5). Five dominant interventions were identified from randomized controlled trials (RCTs) (see Appendix 6).

The intervention group was more effective and more costly in 11 studies, and the intervention was less effective and less costly in four studies (Table 3 and Figure 2). These interventions were likely to be cost-effective, at specified willingness-to-pay thresholds (Appendix 5). Among the six cost-utility studies that reported ICUR, the interventions were favoured in five of these [27, 34, 37, 44, 45] at a willingness-to-pay threshold of \$50 000 per QALY gained.

TABLE 2: Quality assessment of included studies using CHEC-extended checklist.

First author, year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Score (%)	Grade
Arora et al., 2022 [28]	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	95	Good
Ashby et al., 2014 [20]	1	1	1	1	NA (1)	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	95	Good
Avşar et al., 2018 [43]	1	1	1	1	NA (1)	0	1	1	1	0	1	1	0	0	1	0	1	0	0	0	60	Moderate
Balegar et al., 2013 [33]	1	1	1	1	NA (1)	1	0	0	0	0	1	1	1	0	0	0	1	1	1	1	65	Moderate
Forni et al., 2020 [46]	1	1	1	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	80	Good
Greiner et al., 2019 [37]	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	95	Good
Hälleberg et al., 2013 [24]	1	1	1	1	NA (1)	0	0	1	1	1	1	1	1	1	0	0	1	0	1	1	75	Moderate
Heinrich et al., 2013 [51]	1	1	1	1	NA (1)	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	95	Good
Huang et al., 2021 [31]	1	1	1	1	NA (1)	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	90	Good
Hutton et al., 2018 [47]	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	90	Good
Inoue et al., 2015 [40]	1	1	1	1	NA (1)	1	0	0	1	1	1	1	1	1	1	0	1	0	1	0	75	Moderate
Javanbakht et al., 2022 [36]	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	85	Good
Kaitani et al., 2015 [29]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	90	Good
Lee et al., 2014 [53]	0	1	1	1	NA (1)	1	0	1	1	1	1	1	1	1	1	1	1	0	0	0	75	Moderate
Liu et al., 2020 [35]	1	0	1	1	NA (1)	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	85	Good
Lobmann et al., 2019 [23]	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	90	Good
Mak et al., 2015 [21]	1	1	1	1	NA (1)	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	85	Good
Mantravadi, 2017 [54]	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	80	Good
Marsden et al., 2015 [41]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	95	Good
Mathiesen et al., 2013 [38]	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	80	Good
McFarland, 2017 [34]	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	95	Good
Mitchell et al., 2019 [48]	1	1	1	1	0	1	1	0	1	1	1	1	0	1	1	1	1	0	1	1	80	Good
Moore et al., 2013 [39]	0	1	1	1	NA (1)	0	0	0	1	1	1	1	1	1	1	0	1	0	1	1	70	Moderate
Moretti et al., 2022 [32]	1	1	1	1	NA (1)	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	95	Good
Neil et al., 2016 [30]	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	0	80	Good
Padula et al., 2019 [44]	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	85	Good
Padula et al., 2019 [45]	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	90	Good
Panneman et al., 2021 [52]	0	1	1	1	0	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	80	Good
Pedrolo et al., 2018 [49]	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	1	1	85	Good
Silva et al., 2019 [50]	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	75	Moderate
Tan et al., 2016 [26]	1	1	1	1	NA (1)	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	90	Good
Tuffaha et al., 2014 [25]	0	1	1	1	NA (1)	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	90	Good
Walzer et al., 2018 [22]	0	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	0	0	0	65	Moderate
Whitty et al., 2017 [42]	1	1	0	1	NA (1)	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	90	Good
Wu et al., 2021 [27]	1	1	1	1	NA (1)	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	95	Good

Note. NA: not applicable. The items 1–20 assessed in the Consensus Health Economic Criteria (CHEC)–extended checklist are shown in Appendix 2.

As shown in Table 3, Figure 2, and Appendix 5, the intervention group was dominated (i.e., less effective and more costly) by the control in an economic evaluation alongside an RCT: a pressure ulcer prevention care bundle consisting of information and education resources targeted to patients (DVD, poster, brochure, and face-to-face education) and nurse training package was dominated by standard care which was aligned with regional guidelines [42].

4. Discussion

To the best of our knowledge, this is the first study to systematically review the scientific literature to summarize evidence on the economic value of clinical nursing practices. We identified 35 full economic evaluations published between January 2013 and January 2023. The clinical nursing practices were clearly economically favourable (more effective with lower costs) in 19 out of 35 economic evaluations (54.3%), potentially favourable (more effective with higher costs or less effective with

lower costs) in 15 (42.9%), and unfavourable (less effective and more costly) in 1 (2.9%).

It was noteworthy that most interventions were clearly economically favourable or potentially favourable, while only one intervention about pressure ulcer prevention care bundle might represent low-value care (less effective and more costly). Of the economic evaluations included, the number of cost-effective interventions was significantly greater than that of the non-cost-effective. While multifactorial, part of the reason may be that the lack of standardization of the types of costs included and the lack of evaluations from the societal perspective, which may result in misestimating the value of the intervention. In most of the economic evaluation studies included, which were conducted from a healthcare system perspective, only direct costs of the interventions were considered, without including other indirect costs such as productivity costs. Moreover, there may be a risk of publication bias, representing a small fraction of the nursing interventions evaluated for effectiveness, even among those found to be effective [55]. This probably led to misestimates of the

TABLE 3: Results of economic evaluations of clinical nursing practices.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
<i>Lower cost and higher effectiveness</i>										
Arona et al., 2022 [28]	USA	Intervention: ready-to-administer syringe administration of intravenous opioids Control: traditional vial-and-syringe administration of intravenous opioids	Model	CEA	Inpatients	Healthcare system perspective	USD (2021)	Costs of drug preparation and administration, drug waste, and errors	Errors of medication preparation and administration	Cost Intervention: \$8216.97 (Int.\$9322.40) Control: \$8399.58 (Int.\$9529.58) Intervention: 0.0005 Control: 0.0086 ICER: -\$22 554 (-Int.\$25 588.20) (dominant)
Ashby et al., 2014 [20]	UK	Intervention: two-layer hosiery Control: four-layer bandage	RCT	CUA	Adults with venous leg ulcer	Societal perspective	GBP (not stated, assumed 2012)	Costs of trial compression treatments and healthcare consultations	QALY	Cost Intervention: £1492.9 (Int.\$2953.97) Control: £1795.3 (Int.\$3552.32) QALY Intervention: 0.685 Control: 0.651 ICUR: dominant
Balegar et al., 2013 [33]	Australia	Intervention: 48 h-TPN bags Control: 24 h-TPN bags	Before-after study	CEA	Infants receiving TPN	Not stated	AUD (not stated, assumed 2011)	TPN-related expenses (expenses towards purchasing and dispensing)	CLABSI	Cost Intervention: AUD190 153.00 (Int.\$171 093.51) Control: AUD 287 756.00 (Int.\$258 913.53) CLABSI (per 1000-line days) Intervention: 0.4 Control: 0.8 ICER: dominant
Forni et al., 2020 [46]	Italy	Intervention: standard prevention and foam dressing Control: standard prevention only	Model	CEA	Older patients with hip fractures	Healthcare system perspective	Euros (2017) and USD (2017)	Costs of dressing and other materials, nursing time, and treating pressure ulcers	Incidence of pressure ulcer	Cost Italy Intervention: €327.63 (Int.\$540.64) Control: €1059.27 (Int.\$1747.95) US Intervention: \$394.54 (Int.\$493.92) Control: \$1234.16 (Int.\$1545.03) Incidence of pressure ulcer Intervention: 4.5% Control: 15.4% ICER: dominant

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Huang et al., 2021 [31]	Australia	Intervention: continuous positive airway pressure (CPAP) Control: nasal high-flow (nHF)	RCT	CEA	Infants with respiratory distress	Healthcare system perspective	AUD (2019)	Inpatient costs at nontertiary special care nurseries and tertiary NICU and costs of interhospital transfers	Intubation and NICU transfer rates	Cost Intervention: AUD20 606 (Int.\$16 747.10) Control: AUD 21 615 (Int.\$17 567.14) Intubation rate Intervention: 5.9% Control: 13.9% NICU transfer rate Intervention: 9.2% Control:15.7% ICER: dominant
Hutton et al., 2018 [47]	USA	Intervention: catheter-associated urinary tract infection prevention program Control: standard care	Model	CUA	Patients in nursing homes	Healthcare system perspective	USD (2015)	Intervention and disease costs	QALY	Cost Intervention: \$139 948 (Int.\$180 317.17) Control: \$173 986 (Int.\$224 173.72) QALY lost from CAUTI Intervention: 0.35 Control: 0.55 ICUR: dominant
Inoue et al., 2015 [40]	Brazil	Intervention: transparent film dressing Control: hydrocolloid dressing	Cohort study	CEA	Adults with motor and/or neurological limitation for active mobilization in bed	Not stated	BRL (not stated, assumed 2013)	Cost of product	Proportion of patients without pressure ulcer	Cost Intervention: R\$347.60 (Int.\$298.35) Control: R\$1904.00 (Int.\$1634.24) Proportion of patients without pressure ulcer Intervention: 80% Control: 70% ICER: dominant
Javanbakht et al., 2022 [36]	UK	Intervention: automatic respiratory rate monitoring plus intermittent nurse-led respiratory rate monitoring Control: intermittent nurse-led respiratory rate monitoring	Model	CUA	Patients with pneumonia	Societal perspective	GBP (2019)	Costs of the intervention, inpatient care, and management of respiratory compromise	QALY	Cost Intervention: £4752.0 (Int.\$8374.68) Control: £4973.4 (Int.\$8764.86) QALY Intervention: 6.926 Control: 6.917 ICUR: dominant

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Kaitani et al., 2015 [29]	Japan	Intervention: advanced pressure ulcer management protocol Control: conventional care	Model	CUA	Older patients with pressure ulcers	Healthcare system perspective	JPY (2015)	Treatment and labor costs	QALY	<p>Model 1</p> <p>Cost</p> <p>Intervention: JPY¥35 217 (Int.\$423.94)</p> <p>Control: JPY¥67 907 (Int.\$817.46)</p> <p>QALY</p> <p>Intervention: 0.77</p> <p>Control: 0.74</p> <p>ICUR: dominant</p> <p>Model 2</p> <p>Cost</p> <p>Intervention: JPY¥130 567 (Int.\$1571.75)</p> <p>Control: JPY¥256 068 (Int.\$3082.51)</p> <p>QALY</p> <p>Intervention: 0.66</p> <p>Control: 0.59</p> <p>ICUR: dominant</p>
Liu et al., 2020 [35]	China	Intervention: a nursing intervention program Control: routine care	Before-after study	CUA	Immobile patients with stroke	Healthcare system perspective	CNY (2016)	Cost of hospitalization	QALY	<p>Costs</p> <p>Intervention: ¥46 921 (Int.\$15 646.18)</p> <p>Control: ¥51 610 (Int.\$17 209.77)</p> <p>QALY</p> <p>Intervention: 0.179</p> <p>Control: 0.170</p> <p>ICUR: dominant</p> <p>20-week period</p> <p>Cost</p> <p>Intervention: €2864.21 (Int.\$44643.75)</p> <p>Control: €2958.69 (Int.\$4796.93)</p> <p>Wound-healing rate</p> <p>Intervention: 48%</p> <p>Control: 30%</p> <p>ICER: -€530.80 (-Int.\$860.59) (dominant)</p> <p>100-week period</p> <p>Cost</p> <p>Intervention: €5882.87 (Int.\$9537.91)</p> <p>Control: €8449.39 (Int.\$13 699.01)</p> <p>Wound-healing rate</p> <p>Intervention: 94%</p> <p>Control: 81%</p> <p>ICER: dominant</p>
Lobmann et al., 2019 [23]	Germany	Intervention: a TLC-sucrose octa sulfate (TLC-NOSF) dressing Control: a neutral dressing	Model	CEA	Patients with diabetic foot ulcers	Payer's perspective	Euros (not stated, assumed 2017)	Costs of nursing, medical consultations, wound care products, inpatient stays, and pharmacotherapy	Wound healing rate	

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Mak et al., 2015 [21]	China	Intervention: pressurised irrigation Control: swabbing method	RCT	CEA	Patients with wounds healing by secondary intention	Not stated	HKD (not stated, assumed 2013)	Costs of wound cleansing materials, dressing fixation materials, supplementary dressing materials, and nurse labor	Time-to-wound healing	Cost Intervention: HK\$243.7 (Int.\$52.72) Control: HK\$353.8 (Int.\$76.53) Time-to-wound healing Intervention: 11.4days Control: 14.5days ICER: dominant
Mantravadi, 2017 [54]	USA	Intervention: aspiration risk-reduction intervention Control: usual care	Model	CEA	Elderly cancer survivors	Societal perspective	USD (not stated, assumed 2015)	Costs of training, materials, and productivity	Number of aspirations averted	Cost Intervention: \$774.35 (Int.\$10 016.93) Control: \$11 425.70 (Int.\$14 721.54) Number of aspirations averted Intervention: 43.78 Control: 37.38 ICER: dominant
Mathiesen et al., 2013 [38]	Denmark	Intervention: pressure ulcer bundle Control: standard care	Model	CEA	Inpatients	Healthcare system perspective	Euros (2011)	Costs of prevention, healing, complications, and nurses' time	Number of prevented pressure ulcers	Cost Intervention: €79.83 (Int.\$102.99) Control: €118.45 (Int.\$152.82) Number of prevented pressure ulcers Intervention: 90.7% Control: 81.4% ICER: dominant
Mitchell et al., 2019 [48]	Australia	Intervention: chlorhexidine for meatal cleaning prior to urinary catheter insertion Control: saline for meatal cleaning prior to urinary catheter insertion	Model	CEA/CUA	Inpatients who received a urinary catheter	Societal perspective	AUD (not stated, assumed 2017)	Costs of saline and chlorhexidine and antimicrobial therapy	Number of CAUTI prevented, number of asymptomatic bacteriuria prevented, and QALY	Incremental cost: -AUD387 909 (-Int.\$332 553.12) Incremental number of CAUTI prevented: 69.96 Incremental number asymptomatic bacteriuria prevented: 2450.60 Incremental QALY: 1.43 ICER: dominant

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Moore et al., 2013 [39]	Ireland	Intervention: repositioned every 3 hours, using the 30° tilt Control: repositioned every 6 hours, using the 90° lateral rotation	RCT	CEA	Older hospitalized patients	Not stated	Euros (not stated, assumed 2011)	Nurse time costs	Incidence of pressure ulcers	Cost Intervention: €2066.6 (Int.\$346.93) Control: €253.1 (Int.\$425.01) Incidence of pressure ulcers Intervention: 3% Control: 11% ICER: dominant
Moretti et al., 2022 [32]	Canada	Intervention: intermittent pulse oximetry monitoring Control: continuous pulse oximetry monitoring	RCT	CEA	Hospitalized infants with stabilized bronchiolitis	Societal and healthcare system perspective	CAD (2020)	Costs of hospital admission, physician visits, returning to emergency department and any hospital readmissions, productivity lost, and childcare or caregiving	Length of hospital stays in hours	Cost Societal perspective Intervention: CAD6879 (Int.\$6849.14) Control: CAD7428 (Int.\$7395.76) Healthcare system perspective Intervention: CAD4195 (Int.\$4176.79) Control: CAD4716 (Int.\$4695.53) Length of stay Intervention: 37.4 hours Control: 38.5 hours ICER: dominant
Pedrolo et al., 2018 [49]	Brazil	Intervention: chlorhexidine-impregnated dressings Control1: gauze and medical tape for short-term central venous catheter Control2: transparent semipermeable	Model	CEA	Critically ill patients	Healthcare system perspective	USD (2017)	Costs of treatment, hospitalization, cultures for diagnosis and control, and replacement cost of infected catheter	Catheter-related infection prevented	Cost Intervention: \$655 (Int.\$819.99) Control1: \$696 (Int.\$871.32) Control2: \$670 (Int.\$838.77) Catheter-related infection prevented Intervention: 99% Control1: 96% Control2: 97% ICER: dominant

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Walzer et al, 2018 [22]	UK	Intervention: HRTD Control: SAP, SADM, SAKM, and SAE	Model	CUA/CEA	Patients with venous leg ulcers	Payer's perspective	GBP (2017)	Inpatient cost and outpatient cost	Healing of the wound, QALY	Intervention vs. SAP Incremental cost: £37.60 (Int.\$68.84) Incremental effect (healed): 0.92years Incremental QALY: 0.0017 ICER: -£40.75 (-Int.\$74.61) ICUR: -£22 073.30 (-Int.\$40 413.11) Intervention vs. SADM Incremental cost: £171.68 (Int.\$314.32) Incremental effect (healed): 2.42years Incremental QALY: 0.0045 ICER: -£70.90 (-Int.\$129.81) ICUR: -£38 403.23 (-Int.\$70 310.91) Intervention vs. SAKM Incremental cost: £3.13 (Int.\$5.73) Incremental effect (healed): 0.14years Incremental utilities: 0.0003 ICER: -£22.28 (-Int.\$40.79) ICUR: -£12 065.77 (-Int.\$22 090.73) Intervention vs. SAE Incremental cost: £43.63 (Int.\$79.88) Incremental effect (healed): 0.92 years Incremental QALY: 0.0017 ICER: -£47.28 (-Int.\$86.56) ICUR: -£25 612.37 (-Int.\$46 892.65) ICER/ICUR: dominant
<i>Higher cost and higher effectiveness</i>										
Ayşar et al, 2018 [43]	Turkey	Intervention: evidence-based nursing interventions to maintain tissue integrity Control: routine nursing care	Before-after study	CEA	Adult patients	Healthcare system perspective	USD (not stated, assumed 2016)	Costs of prevention and treatment	Deterioration of tissue integrity	Cost Intervention: \$405.97 (Int.\$517.89) Control: \$328.99 (Int.\$419.68) Deterioration of tissue integrity Intervention: 18.2% Control: 54.5% ICER: not reported

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Greiner et al., 2019 [37]	USA	Intervention: doula care Control: no doula care	Model	CUA/CEA	Pregnant women	Societal perspectives	USD (2018)	Costs of birth, labor time, and treating complications	QALY	Cost (in millions) Intervention: \$31 949 (Int.\$39 057.82) Control: \$31 764 (Int.\$38 831.66) Intervention: 41 917 QALY 334 Control: 41 909 717 ICUR: 24 287.78 (Int.\$29 691.94)
Heinrich et al., 2013 [51]	Germany	Intervention: multifactorial fall prevention program Control: usual care	Non-RCT	CEA	Nursing home residents	Payer's perspective	Euros (not stated, assumed 2011)	Costs of inpatient care, nursing home care, intervention, informal care, and ambulatory	Time free of femoral fracture	Cost Intervention: €271.18 (Int.\$485.56) Control: €239.13 (Int.\$428.17) Time free of femoral fracture Intervention: 316.83 days Control: 315.40 days ICER: €7481 (Int.\$13 394.99)
Lee et al., 2014 [53]	Korea	Intervention: delirium prevention strategy Control: usual care	Cohort study	CBA	Patients after liver transplantation surgery	Not stated	USD (2007)	Costs of consultation, medication, equipment, and additional nursing time	Incremental net benefit-cost ratio	Cost: \$38.4 (Int.\$55.91) Benefit: \$5578 (Int.\$8121.76) Incremental net benefit: \$5539.6 (Int.\$8065.85) Benefit-cost ratio: 145.3
Neil et al., 2016 [30]	Canada	Intervention: peristomal skin complications management with ostomy components Control: peristomal skin complications management without components	Model	CUA/CEA	Patients living with an ostomy	Payer's perspective	CAD (2014)	Costs of barriers/pouches, ostomy components, and clinical utilization	Peristomal skin complications events and quality-adjusted life day (QALD)	Cost Intervention: CAD2339 (Int.\$2477.20) Control: CAD2200 (Int.\$2329.99) Peristomal skin complications events Intervention: 520 Control: 650 QALD Intervention: 270538 Control: 269495 ICER: not reported

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Paddula et al., 2019 [44]	USA and Australia	Intervention: prevention protocol to prevent pressure injuries Control: standard prevention	Model	CUA	Older patients	Societal perspectives	USD (2017)	Costs of skin care management, of support surfaces, nursing, dressing, and material and labor	QALY	United States' perspective Cost Intervention: \$211 695.96 (Int.\$265 020.26) Control: \$211 116.51 (Int.\$264 294.85) QALY Intervention: 0.7805 Control: 0.7647 ICUR: \$36 652.23 (Int.\$45 884.60) Australia's perspective Cost Intervention: \$59 410.67 (Int.\$74 375.68) Control: \$58 496.99 (Int.\$73 231.85) QALY Intervention: 0.8449 Control: 0.7874 ICUR: \$15 898.83 (Int.\$19 903.60)
	USA	Intervention 1: repeated risk-assessment for pressure-injury prevention in all patients Intervention 2: repeated risk-assessment for pressure-injury prevention in high-risk groups Control: standard care	Model	CUA	Hospitalized adults	Societal and healthcare system perspective	USD (2017)	Costs of evaluating a patient for hospital-acquired pressure injuries, hospital-acquired pressure injuries, inpatient care, cost of prevention, and lost productivity	QALY	Societal perspective Intervention 1 vs. Control ICUR: \$2000 (Int.\$2503.78) Intervention 2 (Braeden <15) vs. Control ICUR: dominant Intervention 2 (Braeden <19) vs. Control ICUR: \$622 (Int.\$778.68) Health care perspective Intervention 1 vs. Control ICUR: \$2142 (Int.\$2681.55) Intervention 2 (Braeden <15) vs. Control ICUR: dominant Intervention 2 (Braeden <19) vs. Control ICUR: \$622 (Int.\$778.68)
Panneman et al., 2021 [52]	Netherlands	Intervention: multifactorial falls prevention Control: usual care	Model	CBA	Adult patients receiving chemotherapy	Healthcare system perspective	Euros (not stated, assumed 2019)	Intervention cost and cost of injury	Incremental net benefit and benefit-cost ratio	Incremental net benefit: €407 (Int.\$620.89) Incremental benefit-cost ratio: 2.86
Silva et al., 2019 [50]	Brazil	Intervention: infusion pumps with drug library Control: conventional infusion pumps	Model	CEA	Patients in a pediatric Intensive Care unit	Not stated	BRL (2017)	Costs of hospitalization, equipment, and adverse events	Reduction of dose-related adverse events	ICER: R\$4834.13 (Int.\$3191.44)

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Tan et al., 2016 [26]	China	Intervention: ultrasound-guided seldinger PICC Control: conventional method based on direct vein visualization	RCT	CEA	Adult patients	Not stated	CNY (not stated, assumed 2014)	Costs of catheterisation, maintenance and complication treatment	Catheterization effectiveness index	Cost Intervention: ¥3332.97 (Int.\$1121.41) Control: ¥2855.38 (Int.\$960.72) Catheterization effectiveness index Intervention: 89.29% Control: 59.18% ICER: ¥1591.97 (Int.\$535.63)
Halleberg et al., 2013 [24]	Sweden	Intervention: indwelling urinary catheterisation Control: intermittent catheterisation	RCT	CUA	Hip surgery patients	Not stated	Euros (2011)	Costs of material and labor, bladder scan, and urinary tract infection	QALY	Cost Intervention: €3954 (Int.\$723.05) Control: €3642 (Int.\$5271.84) QALY Intervention: 0.093 Control: 0.090 ICUR: not reported
<i>Lower cost and lower effectiveness</i>										
Marsden et al., 2015 [41]	UK	Intervention: 4 hourly repositioning Control: alternating 2 and 4 hourly repositioning	Model	CUA	Older people	Healthcare system perspective	GBP (not stated, assumed 2013)	Costs of repositioning strategies and treating a pressure ulcer	QALY	Cost Intervention: £3656 (Int.\$7080.38) Control: £4197 (Int.\$8128.11) Incremental QALY: 0.000292 ICUR: £1 854 070 (Int.\$3 590 678.91)
McFarland, 2017 [34]	UK	Intervention 1: pH paper testing of aspirate for determining nasogastric tube placement Intervention 2: Chest X-ray for determining nasogastric tube placement Control: no checking procedure	Model	CUA	Adult patients	Payer's perspective	GBP (not stated, assumed 2015)	Costs of nasogastric tube placement and confirmation and complications treatment	QALY	Cost Intervention 1: £43.20 (Int.\$82.02) Intervention 2: £158.64 (Int.\$301.21) Control: £0 (Int.\$0) QALY Intervention 1: 0.11 Intervention 2: 0.12 Control: 0 ICUR (Intervention 1 vs. control): £392.73 (Int.\$745.67) ICUR (Intervention 2 vs. Control): £1322.00 (Int.\$2510.05)

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Tuffaha et al., 2014 [25]	Australia	Intervention: clinically indicated catheter replacement strategy; control: routine replacement strategy	RCT	CEA/CBA	Adult patients	Healthcare system perspective	AUD (2010)	Costs of equipment and staff time	Rate of phlebitis avoided and incremental net monetary benefit	<p>Cost</p> <p>Intervention: AUD61.70 (Int.\$58.12) Control: AUD69.30 (Int.\$65.28) Rate of phlebitis avoided Intervention: 92.84% Control: 93.25% Incremental net monetary benefit: AUD7.60 (Int.\$7.16) Hickman vs. PICC</p>
Wu et al., 2021 [27]	UK	Intervention 1: Hickman Intervention 2: PICC Intervention 3: PORTs	RCT	CUA/CEA	Adult patients	Healthcare system perspective	GBP (not stated, assumed 2019)	Costs of device, device insertion, device removal, device replacement, and complications	QALY, number of complications	<p>Cost</p> <p>PORTs: £2436 (Int.\$4293.08) Hickman: £2481 (Int.\$4372.39) QALY PORTs: 0.746 Hickman: 0.742 Number of complications PORTs: 73 Hickman: 131 ICUR: -£11 250 (-Int.\$19 826.42) PORTs vs. PICCs</p> <p>Cost</p> <p>PORTs: £2706 (Int.\$4768.92) PICCs: £1041 (Int.\$1834.60) QALY PORTs: 0.741 PICCs: 0.759 Number of complications PORTs: 47 PICCs: 93 ICUR: -£56 (-Int.\$98.69)</p>

TABLE 3: Continued.

First author, year	Country	Intervention and comparator	Study design	Evaluation type	Population	Perspective	Currency (price year)	Cost categories	Outcomes	Findings (costs in 2024 int.\$)
Whitty et al., 2017 [42]	Australia	Intervention: patient-centred pressure ulcer prevention care bundle Control: standard care	Cluster RCT	CEA/CBA	Adult patients	Healthcare system perspective	AUD (2015)	Cost of intervention and preventive strategies	Probability of avoiding a HAPU, days free of HAPU, hospital length of stay, and incremental net monetary benefit	<p>Cost</p> <p>Intervention: AUD243.91 (Int.\$218.73) Control: AUD98.90 (Int.\$88.69) Probability of avoiding a HAPU Intervention: 0.93 Control: 0.89 Days free of HAPU Intervention: 6.35 Control: 5.23 Hospital length of stay Intervention: 10.46 days Control: 7.78 days ICER: AUD3296 (Int.\$2955.70) per HAPU case avoided ICER: AUD151 (Int.\$135.41) per additional day free of HAPU Incremental net monetary benefit: -AUD2319.51 (-Int.\$2080.03)</p>

Notes. CUA: cost-utility analysis; CEA: cost-effectiveness analysis; CBA: cost-benefit analysis; CLABSI: central line-associated blood stream infection; HRTD: hydration response technology dressing; SAP: Zetuvit Plus (a super absorbent polymer dressing); SADM: DryMax Extra (a superabsorbent dressing); SAKM: Kerramax Care (superabsorbent dressing); SAE: Eclipse (superabsorbent dressing); Hickman: Hickman-type devices; PICC: peripherally inserted central catheters; PORTs: centrally inserted totally implantable venous access devices; HAPU: hospital-acquired pressure ulcer; ICER: incremental cost-effectiveness ratio; ICUR: incremental cost-utility ratio; USD: US dollars; AUD: Australian dollars; CNY: Chinese Yuan; GBP: Great Britain Pound £; BRL: Brazilian real R\$; CAD: Canadian dollars; HKD: Hong Kong Dollar; JPY: Japanese Yen; DKK: Danish Krone; SEK: Swedish Krona.

Cost-effectiveness	Higher cost	Same cost	Lower cost
Higher effectiveness	Avşar et al., 2018 [43] Greiner et al., 2019 [37] Hälleberg et al., 2013 [24] Heinrich et al., 2013 [51] Lee et al., 2014 [53] Neil et al., 2016 [30] Padula et al., 2019 [44] Padula et al., 2019 [45] Panneman et al., 2021 [52] Silva et al., 2019 [50] Tan et al., 2016 [26]		Arora et al., 2022 [28] Ashby et al., 2014 [20] Balegar et al., 2013 [33] Forni et al., 2020 [46] Huang et al., 2021 [31] Hutton et al., 2018 [47] Inoue et al., 2015 [40] Javanbakht et al., 2022 [36] Kaitani et al., 2015 [29] Liu et al., 2020 [35] Lobmann et al., 2019 [23] Mak et al., 2015 [21] Mantravadi, 2017 [54] Mathiesen et al., 2013 [38] Mitchell et al., 2019 [48] Moore et al., 2013 [39] Moretti et al., 2022 [32] Pedrolo et al., 2018 [49] Walzer et al., 2018 [22]
Same effectiveness			
Lower effectiveness	Whitty et al., 2017 [42]		Marsden et al., 2015 [41] McFarland, 2017 [34] Tuffaha et al., 2014 [25] Wu et al., 2021 [27]

FIGURE 2: Permutation matrix. Note: areas highlighted in green indicate that interventions were dominant (i.e., at least as effective as lower cost). Areas highlighted in yellow indicate that interventions were potentially cost-effective at specified willingness-to-pay thresholds (i.e., more effective and more costly, or less effective and less costly). Areas highlighted in red indicate that interventions were dominated (i.e., the same or less effective and higher costs).

economic benefit of the interventions. The findings suggest the importance of emphasizing the publication of negative studies as much as the positive studies, as the absence of either may lead to publication bias.

It was also of interest to note that five interventions were clearly dominant compared to their comparators, supported by evidence from RCTs. In the hierarchy of research designs, the results of RCTs are considered the highest level of evidence, whereas observational studies are susceptible to potential confounding biases [56]. Therefore, these comparators, with a high level of evidence (RCTs), may present opportunities to reduce low-value care through deimplementation. For instance, “do not recommend routinely repositioning 6 h, using the 90° lateral rotation as the first repositioning choice for most patients to prevent the pressure ulcers” [39], “do not recommend four-layer bandage for healing of venous leg ulcers as the first choice” [20], “do not recommend routinely continuous pulse oximetry monitoring for the supportive care of hospitalized infants with

bronchiolitis” [32], “do not recommend nasal high-flow oxygen for treating respiratory distress in newborns as sole primary support” [31], and “do not recommend swabbing methods in cleansing wounds healed by secondary intention as the first choice, instead, pressurized irrigation” [21].

It should also be considered that although this review included all international articles meeting the inclusion criteria, only 35 full economic evaluations of clinical nursing practices were identified. Moreover, the majority of the economic evaluation studies were conducted in high-income countries, mostly in the UK, the USA, or Australia, with limited evidence from LMICs. In LMICs, where healthcare resources are scarce, more attention should be paid to the evidence from economic evaluation studies to aid in decision-making regarding the allocation of limited healthcare resources. Moreover, studies conducted in LMICs examining the economic evaluations of clinical nursing practices would increase the generalizability of the findings.

In terms of methodological quality, all the included studies demonstrated moderate to good quality, but some methodological limitations were observed. For example, a significant portion of model-based studies (68.4%) failed to specify the structural assumptions or the validation methods of the model. Also, many studies (60.0%) [20, 22–24, 27, 29, 30, 34–36, 38–43, 48, 49, 51, 53, 54] did not discuss the generalizability of the results. In addition, some studies (22.9%) [21, 24, 26, 33, 39, 40, 50, 53] did not specify the perspective adopted in the study, which is critical for the identification of cost components. Moreover, some studies (20%) [24–26, 33, 39, 40, 43] did not incorporate uncertainty analyses. Ideally, both deterministic and probabilistic uncertainty analyses should be conducted within a single economic evaluation to reflect the uncertainty of parameters [57]. These analyses are helpful for assessing the reliability of cost-effectiveness inferences and informing the direction of further research [57]. These findings implied that more attention should be paid to the methodological rigor in these items of economic evaluations of clinical nursing practices in the future.

4.1. Strengths and Limitations. To our knowledge, this is the first systematic review on full economic evaluations of clinical nursing practices, addressing a major knowledge gap on the economic value of clinical nursing practices in both developing and developed countries. We used a comprehensive search strategy that encompassed multiple electronic databases to identify relevant economic evaluations. In addition, two independent reviewers conducted a rigorous quality assessment of the included studies using the CHEC-extended list.

However, our review has several limitations. Although we used a comprehensive search strategy and searched specialised databases, we only searched electronic databases, potentially overlooking economic evaluations of clinical nursing practices that were not available in these databases. Moreover, we restricted the review to studies published in English since January 2013 to ensure its feasibility and relevance to current practices in value-based care. In addition, as cost-effectiveness measures cannot generally be compared across studies, quantitative synthesis was not advisable. Instead, we synthesized results qualitatively using a permutation matrix. We attempted to facilitate comparison between cost-utility studies by applying a unique willingness-to-pay threshold, while the results obtained will be dependent on the chosen threshold. In our study, the cost-utility studies indicating potentially favourable interventions based on willingness-to-pay thresholds were all conducted in high-income countries, where the threshold (\$50 000 per QALY gained) used in our study is widely applied in the literature. Furthermore, the heterogeneity in cost estimates, which may not be generalizable across different regions or countries, is another limitation of our study.

5. Conclusions

Despite these limitations, our study systematically reviewed the evidence regarding the economic value of clinical nursing

practices to advance knowledge on value-based care. We found that interventions were dominant in 19 studies, likely cost-effective in 15 studies, and dominated by comparators in 1 study. Results of this review can help nurses and decision-makers to assess the value of clinical nursing practices. However, caution is needed in extrapolating the results of our study, given the potential for publication bias and certain methodological limitations in the reviewed studies. More high-quality economic evaluations in clinical nursing practices are warranted to provide evidence of their value, particularly in LMICs, improving the cost-effectiveness of healthcare delivery and facilitating the realization of value-based care.

Data Availability

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Disclosure

The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Meng and Guan conceptualized and designed the study. Guan, Meng, Ru, and Kang were involved in data acquisition. Guan, Meng, Ru, and Jia were involved in data analysis and interpretation. Guan, Meng, and Ru drafted the manuscript. Guan, Meng, and Xu critically revised the paper for important intellectual content. Meng obtained funding. Guan and Meng supervised the study.

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Supplementary Materials

Appendix 1: search strategies. Appendix 2: extended consensus on health economic criteria list (CHEC-list). Appendix 3: the studies excluded at full-text screening and reasons for exclusion. Appendix 4: results of risk of bias assessment using CHEC-extended checklist. Appendix 5: results of economic evaluations of clinical nursing practices. Appendix 6: dominant interventions identified from randomized controlled trials. (*Supplementary Materials*)

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Research Article

Toxic Leadership in Emergency Nurses: Assessing Abusive Supervision and Its Team-Level Impacts on Conflict Management and Organizational Commitment

Nourah Alsadaan ¹ and Mohammed Alqahtani ²

¹College of Nursing, Jouf University, Sakaka 72388, Saudi Arabia

²Department of Nursing, College of Applied Medical Sciences, King Faisal University, Alahsa, Saudi Arabia

Correspondence should be addressed to Nourah Alsadaan; naalsadan@ju.edu.sa

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Background. Emergency departments suffer from authoritarian and manipulative leadership styles that affect team dynamics, emotional exhaustion, and quality patient care. However, little research specifically explores these toxic leadership effects on conflict management and nurses' organizational commitment. **Objectives.** This cross-sectional study aimed to assess the correlations between perceived toxic leadership, conflict resolution strategies, and commitment dimensions among emergency nurses while evaluating conflict tendencies as a mediating mechanism. **Methods.** A cross-sectional design that included multiple regression and mediation analyses was utilized. The sample consisted of 387 emergency nurses from five major Saudi hospitals surveyed using validated scales that measure perceived toxic leadership, conflict styles, and organizational commitment. **Results.** High prevalence rates for perceived authoritarian (77%), narcissistic (75%), and unpredictable (63%) leadership were reported. Increased toxicity was positively related to dominating and avoiding conflict styles but negatively related to integrating and compromising strategies. Toxic leadership is also associated with lower affective/normative commitment but higher continuance commitment. Conflict management partially mediated the leadership-commitment relationship, which explained 29% of the total effect. Finally, higher experience and education predicted greater perceived toxicity. **Conclusions.** The significant correlations between destructive leadership, adverse conflict, and reduced commitment in emergency nurses underscore the need for context-specific leadership training. Fostering supportive environments through multifaceted interventions can counteract toxicity impacts, impart constructive communication techniques, improve nurse well-being, and ensure high-quality patient care. As conflict tendencies and nurse characteristics influence susceptibility to detrimental leadership, tailored programs addressing experience levels are vital.

1. Introduction

Emergency departments (EDs) are critical high-stake environments within the healthcare system [1], where the pace is relentless and the margin for error is minimal [2, 3]. These units serve as the central hub for acute treatment, where decisions must be rapid and precise [4–6], with the potential to significantly alter patient outcomes [3]. The intensity and pressure inherent in emergency departments require a leadership style that not only facilitates rapid decision-making but also nurtures

a supportive and cohesive team environment [7, 8]. However, the prevalence of authoritarian and manipulative leadership styles in such settings often undermines these objectives, introducing a toxic dynamic that can severely affect team functionality, staff well-being, and, ultimately, patient care quality [9–11].

Toxic leadership in emergency nursing is characterized by a spectrum of harmful behaviors [12, 13], including but not limited to abusive supervision, rigid top-down control [14], exploitation, self-serving actions, and emotional manipulation [15–17]. These behaviors collectively contribute

to an environment where nursing staff can experience decreased well-being, reduced morale [18, 19], and a general sense of job dissatisfaction [20–23]. The extreme stress and urgency that define emergency care exacerbate the negative repercussions of such leadership, amplifying the challenges faced by nursing teams and compromising the quality of care provided to patients [24–26].

The literature extensively documents the adverse effects of toxic leadership in various organizational contexts, highlighting increased workplace stress, burnout, and emotional exhaustion among employees [27–29]. In the emergency nursing field, these effects are particularly pronounced due to the specialized nature of the work [30], which demands tight coordination among different specialists under intense pressure [31, 32]. Therefore, the vulnerability of emergency nursing teams to toxic leadership is markedly higher, given the critical reliance on effective communication, collaboration, and team cohesion to ensure optimal patient outcomes [33–35].

Despite the well-documented negative impacts of toxic leadership on organizational well-being and performance, there is still a significant gap in understanding how such leadership influences conflict confrontation strategies and organizational commitment among emergency nurses [36, 37]. This gap is particularly concerning given the critical importance of effective leadership in fostering team cohesion, maintaining high-performance standards [38–41], and ensuring the delivery of quality care in high-risk emergency settings [27–31]. Effective communication and the management of interpersonal tensions are crucial for maintaining constructive team dynamics [42, 43]. Yet, there is a dearth of research focusing on how emergency nurses, who are at the frontline of care delivery and coordination, navigate conflicts and maintain commitment in the face of toxic leadership [44–46].

Emergency nursing, with its unique challenges related to coordination, decision-making, and high-stakes outcomes, requires a leadership approach that supports rather than undermines team efforts [47, 48]. The distinct context of emergency care, where patient lives are frequently in the balance, underscores the nonnegotiable need for leadership that promotes rather than detracts from team cohesion, performance, and care standards [42, 49]. Therefore, there is a pressing need for research that specifically examines the repercussions of toxic leadership on emergency nurses [50, 51], particularly in terms of their strategies for confronting conflicts and their perceptions of organizational commitment [45, 52–56].

This study aims to address these critical gaps by providing an in-depth analysis of the impacts of toxic leadership on conflict resolution and organizational commitment among emergency nursing staff. By focusing on the unique challenges and dynamics of emergency nursing, the research seeks to uncover the specific ways in which toxic leadership behaviors manifest in this context and their implications for team dynamics, nurse well-being, and patient care. The ultimate goal is to inform targeted interventions and reforms that promote constructive communication and ethical

leadership practices and support the well-being of nursing staff, thus improving the overall quality of emergency care delivery.

In doing so, this study not only aims to contribute to the existing body of knowledge on leadership in healthcare but also to provide practical insights that can guide the development of policies and practices to mitigate the negative effects of toxic leadership in emergency departments. By elucidating the mechanisms through which toxic leadership impacts emergency nursing teams, this research underscores the urgent need for systemic changes that foster healthier team dynamics, improve nurse welfare, and, most importantly, improve patient outcomes in these high-pressure settings.

2. Materials and Methods

2.1. Objective

- (1) Assess the prevalence of the perceived impact of toxic leadership behaviours experienced by emergency department nurses.
- (2) Investigate the relationship among the perceived impact of toxic leadership, organizational commitment, and conflict management strategies used by emergency department nurses.

2.2. Design. A cross-sectional design was used that included a survey of emergency nurses in a single dimension and commitment dimensions [57]. The ability to collect substantial descriptive numerical data from a relatively large sample to support quantitative statistical analysis was also an asset for investigating complex phenomena within emergency nursing environments [58]. Additionally, cross-sectional designs enable accessing samples with diverse perspectives, compared to case studies or longitudinal approaches, which tend to involve fewer subjects. Therefore, the methodology facilitated the evaluation of the impacts of perceived toxic leadership that can be generalizable in five major emergency departments [59]. Overall, the cross-sectional approach offered feasibility and generalizability advantages that aligned well with the study's objectives.

2.3. Settings. This study was completed in emergency care units of five large public hospitals in the northern province of Saudi Arabia. These hospitals provide emergency services to residents in major metropolitan areas, as well as smaller rural communities in the region. Emergency departments treat a high volume of patients annually and are staffed by nurses, physicians, specialists, and support personnel. The units operate 24/7 to provide critical and trauma care.

2.4. Sample. A systematic multistage sampling approach was adopted to select participants from large public emergency departments in a northern province. Initially, five hospitals were chosen according to predefined inclusion criteria. The target population was emergency department nurses who worked full-time and met inclusion criteria in five major

public hospitals with emergency medicine departments in the Hail region of northern Saudi Arabia. These hospitals provide emergency and trauma services to urban and rural catchment areas. The parameters defining this population include their employment status (full-time registered nurses), primary workplace setting (emergency departments), and direct participation in patient care activities.

Power analysis was performed using RaoSoft software to determine the recommended sample size. The input included a 95% confidence level, a 5% error margin, an estimated population of nurses of 580 across sites, and a 50% response distribution. These parameters detected medium effect sizes between study variables with 80% power. The minimum adequate sample size calculated was 387 subjects. This aligned with the recommendations that nursing research should have sufficient power [60, 61].

The RaoSoft tool was chosen for its user-friendly interface and its ability to provide accurate sample size estimates based on essential criteria such as confidence level, margin of error, and expected distribution of responses [62]. Its application in our study was based on a methodological approach that values precision and adherence to the statistical norms recognized by the academic community. This approach ensures that our findings are robust and that the sample size adequately supports the study objectives and anticipated analyses.

A purposive, multistage sampling technique was utilized during recruitment at departmental meetings, through informational flyer distribution, and researcher visits. Of approximately 580 eligible nurses, 580 were invited to participate over a 15-day period [63]. Emphasizing voluntary participation and confidentiality during recruitment aimed to minimize sampling bias by encouraging representative enrollment across specialty experience levels.

Purposive sampling was utilized to recruit participants with substantial emergency department experience who could intentionally provide meaningful perspectives on the leadership dynamics central to this research. Although probability methods have advantages with respect to representativeness and generalizability, accessing informed participants was an efficient way to obtain rich insights into this complex phenomenon. During the multistage recruitment process, concerted efforts were made to emphasize voluntary participation and transparency around the purposes of the study to mitigate biases and approximate a representative enrollment of providers. However, the input to assess alternative probability sampling methods is valuable advice should subsequent follow-up studies be conducted to generalize findings further.

Finally, 387 nurses completed the survey packet, representing a response rate of 67%. This purposive approach supported accessing informed perspectives on a complex phenomenon from an adequately powered sample of experienced emergency department nurses. The sampled nurses reflected a diversity of ages, experience levels, genders, and education levels. Limitations include regional specificity since nurses were recruited from within a single Saudi Arabian province rather than nationally.

2.5. Eligibility Criteria

(i) Inclusion criteria:

- (1) Registered nurses employed full-time in emergency departments.
- (2) At least one year of experience in emergency care settings.
- (3) Currently working in selected public hospitals in the northern province of Saudi Arabia.
- (4) Provided informed consent to participate in the study.

(ii) Exclusion criteria:

- (1) Nurses who took extended leave (e.g., maternity) in the last 6 months.

2.6. Data Collection Tools. Rigorously developed, psychometrically sound instruments were used to ensure a valid and reliable measurement of key variables, including perceived toxic behaviors, conflict tendencies, and organizational commitment. Extensive prior research provides confirmation of strong validity and reliability for the selected tools in various settings [64–68]. Reevaluation among the target nursing population during piloting further upholds these measurement properties. The following descriptions provide an overview of each established data collection tool, including interpretations.

(1) Toxic Leadership Assessment [69]:

This 30-item scale developed by Schmidt (2008) measures perceived toxicity that spans five dimensions: abusive supervision, authoritarian leadership, narcissism, self-promotion, and unpredictability. Items use a scale of agreement of 1–6, with higher scores indicating greater perceived destructive behaviors. Previous studies in all fields produced Cronbach's alpha scores of 0.82–0.96 [65, 70], suggesting excellent internal reliability. The analysis of confirmation factors during the pilot test supported the multidimensional structure and validity of the construction among the target nurse population.

(2) Rahim Organizational Conflict Inventory-II (ROCI-II) [67]:

Developed by Rahim in 1983, this validated inventory identifies the tendencies of conflict management style on five subscales: dominating, avoiding, obliging, compromising, and integrating. The 28 items reflect varying concerns for self-versus others when facing conflicts using a 5-point Likert scale. Extensive research reports that Cronbach's alpha reliability coefficients exceed 0.70 on subscales, indicating solid internal consistency and the ability to discriminate styles [71]. Pilot testing among nurses confirmed the reliability and stability of the factor structure.

(3) Organizational commitment scale [72].

This instrument, conceptualized by Meyer and Allen (1991), assesses employee attachment across three commitment dimensions: affective, normative, and continuance. Using a 7-point Likert agreement format, higher scores reflect stronger feelings of emotional connection, perceived obligation, and necessity-driven commitment, respectively [72, 73]. Confirmatory research supports predictive validity regarding outcomes like turnover and performance [73]. Reliability analysis during piloting maintains internal consistency with an alpha of 0.88.

2.7. Ethical Approval. Ethical approval for this study was obtained from the Research Ethics Committee for Health Affairs in the Hail region, KSA (IRB: KACS, KSA: H-08-L-074). Permission to access the study sites and participants was granted by the nursing directors of the five participating emergency departments. Participants were provided with information sheets detailing the purpose of the study, voluntary participation, potential risks/benefits, and confidentiality measures. Written informed consent was obtained from each participant before the distribution of the surveys, and they had the option to withdraw at any time. The study followed ethical guidelines for nursing research according to the Declaration of Helsinki and the Code of Ethics of the International Council of Nurses, and the Ethics Committee reviewed all procedures and protocols to protect the rights and welfare of participants.

2.8. Procedure. A systematic procedure was developed, validated, and implemented to obtain quantitative measurements that aligned with the study objectives on perceived toxic leadership and the consequent outcomes among emergency nurses.

Following approval from the institutional ethics review board, the data collection process began across the 5 major hospital sites based on a multistage cluster sampling technique detailed in the dedicated Sample and Sampling section. The directors of the nursing department also provided site access approvals prior to recruitment.

The initial participation of the participants involved raising awareness through announcements at staff meetings and informational flyers on the importance of leadership dynamics research to evoke interest among emergency nurses. For nurses expressing interest and meeting the experience inclusion criteria, the principal investigator obtained written informed consent to participate after discussing:

- (i) The purpose is to investigate perceived leadership behaviors and impacts.
- (ii) Survey response process and types of deidentified data collected
- (iii) Minimal risk and direct benefits associated with voluntary participation
- (iv) Right to withdraw participation anytime despite initial agreement

- (v) Storage of completed surveys in an access-restricted locked cabinet

Consenting participants received numbered survey packets, including validated Likert-type scale instruments on perceived leadership toxicity (30 items), conflict confrontation tendencies (28 items), and organizational commitment (24 items), along with a basic demographic questionnaire. The packets had an estimated completion time of 15–20 minutes during work hours without disrupting the operation of the emergency department.

The sealed envelope collection boxes were placed in accessible common staff areas within each unit for returned packets over 2 consecutive weeks. Daily secured recovery, storage protocols, and tracking of response rates enabled midpoint reminders to optimize participation and motivational prompts during meetings to underscore the importance and encourage collaboration.

At the conclusion of the study, a participation rate of 67% was achieved, providing 387 fully completed nurse surveys for sufficient statistical power in the planned quantitative analyses. Encrypted data sets excluded any identifying details to uphold respondent rights and confidentiality standards governing ethical research. Restricted access and data aggregation protected anonymity prior to controlled analyses. This rigorous procedure allowed significant quantitative measurements aligned directly with the specific research questions on perceived toxic leadership outcomes.

2.9. Statistical Analysis. All data were analyzed using SPSS version 22.0 (IBM Corp, Armonk, NY). Descriptive statistics, such as means and standard deviations, summarized sample demographics and scale measurement scores. Pearson's correlation analysis quantified the bivariate relationships among perceived toxicity, conflict management styles, and organizational commitment types. Multiple linear regression examined predictors of affective commitment. The mediation analysis evaluated whether conflict management tendencies mediated the effect of destructive leadership on reduced commitment. For all tests, a p value <0.05 was considered statistically significant. Reliability analysis confirmed the internal consistency of measurement instruments. The assumptions of parametric testing were checked, including normality and homoscedasticity evaluation to meet the application criteria. The effect sizes were calculated to quantify the strengths of the observed relationship.

3. Results and Discussion

3.1. Results. The results of this cross-sectional study provide important insights into the complex relationships between perceived toxic leadership, conflict management approaches, and organizational commitment among emergency department nurses. Key findings demonstrate the high prevalence of destructive leadership behaviours reported by participants, with authoritarian, narcissistic, and unpredictable actions notably prevalent. Significant

TABLE 1: Demographic characteristics of emergency care nurses ($n = 387$).

Variable	Category	<i>N</i>	%
<i>Age</i>	25–30 years	152	39
	31–40 years	170	44
	41–50 years	53	14
	>50 years	12	3
	<i>Gender</i>	Male	162
	Female	225	58
<i>Marital status</i>	Single	127	33
	Married	152	39
	Divorced	75	19
	Widowed	33	9
<i>Education level</i>	Diploma	75	19.4
	Bachelor's degree	250	64.6
	Master's degree	62	16
<i>Years of experience</i>	1–5 years	180	47
	6–10 years	152	39
	11–15 years	37	10
	>15 years	18	4

correlations emerged between perceived toxicity and conflict management styles, with passive and aggressive approaches positively associated but constructive strategies negatively related. Toxic leadership also related to lower affective/normative commitment but higher continuance commitment. Furthermore, conflict tendencies were found to partially mediate the link between destructive leadership and reduced commitment. Finally, higher nurse experience and education predicted higher perceived toxicity. The following sections delve deeper into these results, underscoring the need for supportive leadership and conflict training tailored to the intense emergency context. Elucidating these dynamics is the first step toward fostering healthy environments where nurses can thrive and provide optimal patient care even in high-stake situations.

Table 1 presents key demographic characteristics of the 387 emergency care nurses sampled in this study. The table shows a relatively young sample, with 83% under 40 years of age. Most were women (58%), typical for the nursing field. A range of education levels were represented, from diplomas to master's degrees, with most holding a bachelor's degree (65%). In terms of experience, most nurses had 1–10 years of tenure (72%), while few were new nurses or very experienced.

Table 2 effectively highlights the prevalence and characteristics of perceived toxic leadership behaviours among emergency nurse leaders. Inclusion of both the percentage of respondents reporting each behaviour and the mean score with standard deviations offers a nuanced understanding of the problem. The table shows that authoritarian leadership and narcissism are the most commonly perceived toxic behaviours, with 77% and 75% of nurses reporting these experiences, respectively, and correspondingly high mean scores (4.0 and 3.9). This suggests a significant impact of

TABLE 2: Prevalence of perceived toxic leadership behaviours among emergency nurse leaders.

Toxic leadership behaviour	<i>N</i>	%	Overall toxic leadership ($M \pm SD$)
Self-promotion	212	55	2.8 \pm 0.6
Abusive supervision	167	43	2.3 \pm 0.7
Unpredictability	245	63	3.3 \pm 0.5
Narcissism	289	75	3.9 \pm 0.4
Authoritarian leadership	298	77	4.0 \pm 0.3

these behaviours on the workplace. In contrast, abusive supervision, although serious, is reported less frequently (43%), with a lower mean score of 2.3. The range of standard deviations (0.3 to 0.7) indicates the variability in how these behaviours are experienced among the respondents. The high prevalence rates, combined with notable mean scores, underscore the critical nature of addressing toxic leadership in emergency nursing settings to improve workplace dynamics and overall quality of care.

Table 3 of the study presents insightful findings on the relationship between various toxic leadership behaviours and organizational commitment, mediated by conflict management styles. The table reveals a negative correlation between all forms of toxic leadership and organizational commitment, indicating that higher levels of toxic behaviour's correspond to lower levels of commitment among emergency care nurses. In particular, authoritarian leadership shows the strongest negative correlation (-0.45), suggesting that it has the most detrimental impact on organizational commitment. The sizes of the mediation effect, ranging from 0.15 for self-promotion to 0.22 for authoritarian leadership, indicate that conflict management styles play a significant role in mediating these relationships. The statistical significance of these relationships is further underscored by the p values, with most falling below 0.001. These data imply that the way nurses manage conflict can significantly buffer or amplify the negative effects of toxic leadership on their commitment to the organization.

Table 4 presents the results of a mediation analysis that examined whether the conflict management style of nurses mediated the relationship between perceived toxic leadership and organizational commitment. The significant indirect effect ($B = -0.33$) suggests that conflict management partially mediates the association between perceived toxic leadership and commitment. This lends preliminary support to the hypothesis that leadership toxicity may influence nurses' conflict approaches, which in turn impacts their organizational commitment. However, the cross-sectional design prevents determining directionality or causality. The results should also be interpreted with caution given the reliance on subjective assessments of leadership toxicity. However, the table succinctly conveys that conflict management appears to play a mediating role in the link between perceived toxic leadership and organizational commitment among these emergency care nurses. The results provide initial evidence that the modification of conflict approaches could potentially counteract some negative impacts of toxic leadership on nurses' commitment.

TABLE 3: Relationship between toxic leadership and organizational commitment mediated by conflict management.

Toxic leadership behaviour	Correlation with organizational commitment	Mediation effect size	<i>p</i>
Self-promotion	-0.31	0.15	<0.01
Abusive supervision	-0.35	0.18	<0.01
Unpredictability	-0.40	0.20	<0.001
Narcissism	-0.42	0.21	<0.001
Authoritarian leadership	-0.45	0.22	<0.001

TABLE 4: Mediation analysis of the conflict management style on the relationship between toxic leadership and organizational commitment.

Path	<i>B</i>	SE	<i>p</i>
Toxic leadership in conflict management	0.57	0.08	<0.001
Toxic leadership to organizational commitment	-0.42	0.09	<0.001
Conflict management to organizational commitment	-0.33	0.07	<0.001

Table 5 presents the results of a multiple linear regression model that predicts the affective organizational commitment of nurses to perceive toxic leadership, avoidant conflict style, integration of conflict style, age, and education level. The model was significant, which explained 28% of the variance in affective commitment. Higher perceived toxicity and avoidant conflict are independently related to lower affective commitment, while integrating style and age are associated with higher commitment. The large sample size lends confidence in the findings. However, limitations include the cross-sectional design and the reliance on subjective assessments. The variation of the common method can also inflate the relationships between the measured variables. However, the table succinctly summarizes key predictors of nurses' affective commitment, highlighting the negative impacts of destructive leadership and conflict avoidance, as well as the positive effects of collaborative conflict management.

Table 6 shows the results of a hierarchical linear regression mediation analysis. The significant indirect effect indicates that conflict management partially mediated the relationship between perceived toxic leadership and organizational commitment. Approximately 29% of the total effect of leadership on commitment operated indirectly through conflict management styles. This supports the hypothesis that toxic leadership may influence nurses' conflict approaches, which then affects their commitment. However, the cross-sectional design prevents determining causation or directionality. The subjective nature of leadership and conflict measures should also be considered. However, the table succinctly summarizes evidence that conflict management plays a mediating role in the association between perceived toxic leadership and commitment among these nurses. It points to the conflict style as a potential mechanism through which destructive leadership relates to reduced organizational commitment.

TABLE 5: Multiple linear regression analysis that predicts affective organizational commitment.

Variable	<i>B</i>	SE <i>B</i>	β	<i>p</i>
(Constant)	2.83	0.23		<0.001
Toxic leadership	-0.41	0.07	-0.32	<0.001
Avoidant conflict style	-0.38	0.09	-0.28	<0.001
Integrating conflict style	0.26	0.08	0.21	0.002
Age	0.02	0.01	0.14	0.012
Education level	-0.18	0.09	-0.11	0.048

Table 7 presents the results of a logistic regression model that predicts the likelihood that nurses will perceive high levels of toxic leadership based on their demographics. Nurses with higher education levels and more years of experience showed significantly greater odds of reporting high toxicity. The model provides initial evidence that personal factors can affect perceptions and experiences of destructive leadership behaviours. However, the cross-sectional design prevents determining causality. Response biases are also a concern with self-reported leadership ratings. However, the table succinctly summarizes the exploratory findings suggesting that nurse education and tenure may predict perceived leadership toxicity, warranting further investigation. Although preliminary, the results point to potential vulnerabilities based on nursing background that could inform prevention efforts.

3.2. Discussion. This cross-sectional study aimed to address gaps regarding perceived toxic leadership impacts on conflict and commitment specifically in emergency nursing. The objectives were to assess the prevalence of the perceived impact of toxic leadership behaviors experienced by emergency department nurses and investigate the relationship between the perceived impact of toxic leadership, organizational commitment, and conflict management strategies used by emergency department nurses. By elucidating these complex dynamics, the intent was to inform interventions tailored to intense emergency contexts where leadership failures could profoundly impact nurse and patient outcomes. The following discussion interprets results regarding the stated objectives of delineating relationships among perceived toxic leadership, conflict management, and commitment in this understudied yet high-stake specialty setting.

Leadership behaviors have far-reaching impacts in healthcare settings, yet toxic leadership remains an understudied phenomenon among nurses [23, 74]. This concern is

TABLE 6: Mediation analysis using hierarchical linear regression.

Effect	<i>B</i>	SE <i>B</i>	<i>t</i>	<i>p</i>
Total effect				
Toxic leadership → commitment	-0.53	0.08	-6.98	<0.001
Direct effect				
Toxic leadership → commitment	-0.24	0.09	-2.73	0.007
Indirect effect				
Toxic leadership → conflict → commitment	-0.29	0.07	-4.25	<0.001

TABLE 7: Logistic regression predicts the likelihood of high toxic leadership based on nurse demographics.

Predictor	<i>B</i>	SE	Wald	<i>p</i>	Odds ratio
Age	0.02	0.04	0.21	0.646	1.02
Years of experience	0.18	0.09	3.92	0.048	1.20
Education level	0.67	0.28	5.73	0.017	1.95
Marital status	-0.34	0.20	2.88	0.090	0.71

due to evidence linking detrimental leadership with poorer clinical outcomes, staff well-being, and quality care [75]. Emergency departments represent a high-stake context where leadership failures could have dire consequences [76]. However, little research has examined toxic leadership among emergency nurses specifically [23, 39, 77, 78]. This study helps address this gap by elucidating the impacts of perceived toxicity on the management of nurses' conflicts and organizational commitment. The findings promise to inform interventions to foster healthy leadership and optimal team functioning in this fast-paced environment where lives are on the line.

Our sample of 387 nurses from five emergency departments in Saudi Arabia reported high perceived toxicity, especially authoritarian, narcissistic, and unpredictable behaviours. Leadership toxicity was positively correlated with passive and aggressive conflict styles but negatively associated with constructive conflict approaches. Additionally, the increased perceived toxicity is related to a lower affective/normative commitment but a greater commitment to continued commitment. A salient finding was the mediating effect of conflict management, which explained nearly a third of the relationship between leadership and commitment. Finally, nurses with more experience and education showed a greater likelihood of perceiving toxic leadership.

3.2.1. Prevalence of Toxic Leadership Behaviours. The high prevalence of perceived authoritarian (77%), narcissistic (75%), and unpredictable (63%) leadership behaviours confirm toxic leadership as an issue in emergency care settings. These rates exceed estimates from a recent meta-analysis that aggregates toxicity prevalence between industries (10–15%) [23]. The extreme stress and urgency of emergency departments can partially explain this elevated toxicity [7, 41]. However, the authors in [79] found lower perceived toxicity among Indian emergency nurses (14–23% for different behaviours). This discrepancy highlights the need for comparative data from multiple sites, as the

organizational and cultural context can influence the prevalence. Furthermore, the reliance of this study on self-reports could bias the results, as nurses' attitudes, expectations, and attributions shape their perceptions of leaders [80, 81]. Integrating peer, supervisor, and patient assessments would provide a more balanced perspective.

3.2.2. Conflict Management as a Mechanism. A significant finding was the mediating effect of conflict management, which explained almost a third of the total leadership-commitment relationship. This proposes conflict tendencies as a key mechanism that converts toxic leadership into attitudinal outcomes. Longitudinal and experimental studies could further validate this mediation model and directionality [82–84]. However, the results suggest that strengthening nurses' conflict management skills could potentially neutralize some detrimental impacts of poor leadership.

3.2.3. Individual Susceptibility Factors. Finally, higher education and experience predicted greater perceived toxicity compared to some research in which novice nurses reported worse leadership [85]. It implies that standards for acceptable leader conduct increase with experience. Alternatively, toxic leaders can target underconfident junior nurses. In either case, the results underscore the need to cultivate leadership skills at all levels and protect those most vulnerable.

3.2.4. Relationships among Toxic Leadership, Conflict Management, and Commitment. Significant positive correlations emerged between perceived toxic leadership and dominating/avoiding conflict styles, while negative associations with integrating and compromising approaches were observed. This is consistent with meta-analytic findings linking abusive supervision to more passive and aggressive conflict tendencies [86, 87]. However, contrasting reports show toxic leadership that specifically relates to avoiding rather than dominating conflict [23, 88]. This discrepancy could reflect situational factors, as the emergency context may require more dominant behaviors to match the urgency. Additionally, higher perceived leadership toxicity is related to lower affective/normative commitment but higher continuance commitment. These results support conclusions from a nursing review that identified leadership as an important determinant of organizational commitment [32, 89, 90]. However, the authors in [91] found no

association between perceived toxicity and overall commitment among nurses. This discrepancy highlights potential cross-cultural variations in leadership-commitment dynamics.

3.2.5. Mediating Role of Conflict Management. A significant finding was the mediating effect of conflict management on the toxic leadership-commitment relationship, which explained 29% of the total effect. This suggests that leadership behaviors can alter nurses' conflict approaches in a way that reduces commitment. Although scarce research has directly tested this mechanism, the authors in [92] similarly implicated conflict management as a mediator in the leadership-engagement relationship. However, the cross-sectional design prevents causal inferences. Longitudinal designs could help establish directionality.

3.2.6. Practical Implications and Future Directions. The findings of this study underscore the critical need for the development of conflict management training programs specifically tailored for emergency department nursing staff. Such initiatives could potentially serve as a buffer against the detrimental effects of toxic leadership, potentially improving organizational commitment and workplace morale. Future research should extend these findings through longitudinal studies to determine the long-term impact of conflict management training, examine individual nurse characteristics that affect perceptions of leadership, and assess implications for patient care outcomes. Expanding the scope of research to include diverse cultural and organizational settings would enrich the understanding of toxic leadership dynamics in the emergency care environment.

4. Conclusions

This cross-sectional study provides valuable insights into the concerning prevalence of perceived toxic leadership behaviors among emergency department nurse leaders and the implications for nurses' conflict management approaches and organizational commitment. Key findings demonstrate high rates of authoritarian, narcissistic, and unpredictable leadership, which are positively associated with destructive conflict tendencies like domination and avoidance. In turn, these connect to lower affective/normative commitment. A salient finding is that conflict management explains almost a third of the total effect of toxic leadership on reduced commitment. The significant correlations found among toxic leader behaviours, adverse conflict strategies, and diminished commitment highlight the vital need to cultivate supportive leadership that fosters constructive communication and healthy team dynamics in intense, high-stake emergency departments. Doing so promises to improve nurses' well-being, performance, and patient care quality. The mediating effect of conflict management also suggests that this could be leveraged to mitigate detrimental leadership impacts.

However, there are limitations given the single-source design and reliance on subjective measurement. The cross-

sectional methodology also prevents determining causality. Follow-up longitudinal and experimental studies validating the directionality and causal pathways are warranted. Additionally, the sample is regionally limited so that generalizability may be restricted. Nonetheless, by elucidating the prevalence and outcomes associated with destructive leadership in understudied emergency care contexts, this study meaningfully informs policies, training programs, and interventions to counteract toxicity.

Data Availability

The data will be available on request.

Ethical Approval

This study was carried out with the approval of the Health Affairs, Hail Region, KSA with IRB: KACS, KSA: H-08-L-074.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Transformational Leadership, Psychological Empowerment, and Organizational Citizenship Behaviors among Nursing Workforce: A Single Mediation Analysis

Ibrahim Abdullatif Ibrahim ^{1,2}, Ahmed Hashem El-Monshed ^{3,4}, Marwan Altheeb ³,
and Mohamed Gamal El-Sehrawy ^{5,6}

¹Nursing Department, College of Applied Medical Sciences, Shaqra University, Shaqra, Saudi Arabia

²Department of Nursing Administration, Faculty of Nursing, Mansoura University, Mansoura, Egypt

³Department of Nursing, College of Health and Sport Sciences, University of Bahrain, Manama, Bahrain

⁴Department of Psychiatric and Mental Health Nursing, Faculty of Nursing, Mansoura University, Mansoura, Egypt

⁵Department of Nursing, College of Applied Medical Sciences, Prince Sattam Bin Abdulaziz University, AlKharj, Saudi Arabia

⁶Department of Nursing Administration, Faculty of Nursing, Port Said University, Port Said, Egypt

Correspondence should be addressed to Mohamed Gamal El-Sehrawy; m.elsehrawy@psau.edu.sa

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Aim. To explore the mediating effect of psychological empowerment in the association between transformational leadership and organizational citizenship behaviors in nursing context. **Background.** Healthcare organizations worldwide are facing unprecedented challenges, necessitating effective leadership strategies to ensure quality patient care and organizational success. Transformational leadership has emerged as a tool to promote positive workplace behaviors, including organizational citizenship behaviors, among nursing staff. However, the mediating role of psychological empowerment in this relationship remains underexplored. **Methods.** A cross-sectional survey was conducted from March 2023 until August 2023 involving 305 registered nurses at King Khalid Hospital to investigate the relationship among transformational leadership, psychological empowerment, and organizational citizenship behaviors. Validated scales were used to assess these variables. A single mediation analysis was conducted through processing macro version 3.5 model 4. **Results.** This study found a strong positive association between transformational leadership and both psychological empowerment ($r = 0.507$, $p < 0.001$) and organizational citizenship behaviors ($r = 0.445$, $p < 0.001$) among nursing staff. Additionally, psychological empowerment partially mediated the relationship between transformational leadership and organizational citizenship behaviors, with a significant indirect effect ($B = 0.110$, $CI: 0.058-0.166$). **Conclusions.** Transformational leadership positively impacted nurses' feelings of empowerment, which then led to higher exhibition of organizational citizenship behaviors. **Implications for Nursing Management.** Leadership development programs should prioritize the cultivation of transformational leadership qualities and support the psychological empowerment of nursing staff. This approach can enhance organizational effectiveness, foster positive workplace environments, and improve patient outcomes.

1. Introduction

Healthcare is currently experiencing substantial transformation due to the prevailing economic challenges worldwide. At the same time, demographic patterns are evolving, with a notable increase in the aging population in the most affluent nations of the industrialized world,

combined with a growing global population. In this dynamic healthcare landscape, the ability to meet rigorous standards is paramount and this necessitates the implementation of effective leadership styles [1, 2].

Nurse leadership emerges as a particularly crucial element in this unpredictable and occasionally tumultuous world of healthcare. Nurse leaders play a vital role in

ensuring the delivery of safe, evidence-based treatment that enhances the overall patient experience. Their guidance and expertise contribute to maintaining high standards of care and promoting positive patient outcomes [3]. Throughout history, nurse leaders have consistently demonstrated strong management abilities. However, to truly excel as a leader, one must possess transformational leadership skills. This entails the ability to inspire and motivate individuals on a personal level, encouraging them to take innovative actions that lead to the attainment of optimal outcomes. By embodying transformational leadership qualities, nurse leaders can foster a culture of innovation, collaboration, and continuous improvement, ultimately enhancing the quality of care and patient outcomes [4].

Transformational leaders exhibit effective communication, inspire others, demonstrate enthusiasm, foster positive change, and guide individuals towards shared objectives that enhance nurses' wellbeing [5]. Transformational leadership is crucial for achieving exceptional organizational performance and efficiency. Additionally, transformational leaders can significantly improve staff satisfaction by providing support and motivation, empowering employees, encouraging constructive feedback, fostering open communication, and demonstrating respect [6]. Transformational leadership inspires people to surpass their usual duties, promoting flexibility and dedication to a shared goal or mission. These additional efforts, referred to as organizational citizenship behaviors (OCBs), help strengthen the workplace environment by exceeding expectations and have been associated with enhanced organizational performance [7].

Moreover, transformational leaders recognize the importance of empowering their staff by delegating authority, fostering accountability, and involving employees in decision-making processes. This acknowledges the increasing need to promote OCBs to maximize the efficient use of limited resources [7, 8].

Concurrently, OCBs have been observed as a significant predictor of employees' productive work [9]. To foster these kinds of behaviors, organizations must provide additional consideration. For instance, when employees lack sufficient information and control over their job duties, have limited involvement in decision-making, experience communication issues, or feel dissatisfied with leadership, it can exacerbate negative behaviors such as turnover. These factors directly oppose the principles of psychological empowerment [10].

In this study, we aim to investigate the influence of transformational leadership on OCBs through psychological empowerment. Specifically, we argue that transformational leaders can enhance nurses' psychological empowerment by elevating the significance they attribute to their work, equipping them with the necessary skills for task completion, and fostering a sense of control over their environment. This assumption builds on the theoretical idea of social exchange theory [11]. According to social exchange theory, employees engage in discretionary behaviors, such as OCBs, when they perceive that their efforts are valued and rewarded by their leaders or the organization. Transformational leadership, which emphasizes inspiring and empowering followers, can

foster a supportive work environment where employees feel psychologically empowered to engage in OCBs as a form of reciprocal exchange for the positive leadership they receive.

Previous studies have investigated the distinct associations among transformational leadership, psychological empowerment, and OCBs [12, 13]. Nevertheless, there exists a lack of research concerning the manner in which psychological empowerment serves as a mediator in the relationship between transformational leadership and OCBs, particularly within the nursing workforce. This study will contribute to the existing literature by providing insights into the mediating role of psychological empowerment in the relationship between transformational leadership and OCBs within the nursing context. By examining the mediating pathways, this research will enhance our understanding of the mechanisms underlying these relationships, offering valuable implications for healthcare management and leadership development.

1.1. Literature Review and Hypotheses Development

1.1.1. Transformational Leadership and OCBs. The hallmark of a transformational leader is their capacity to uplift and encourage subordinates to reach greater heights of achievement and personal development [5]. A multitude of studies have been conducted on the transformational leadership style, consistently demonstrating its significant impact on employee commitment, satisfaction, and overall organizational performance. The findings consistently highlight the positive association between transformational leadership and employee outcomes, such as increased job satisfaction, higher levels of organizational commitment, and improved performance [14, 15].

A prior research has demonstrated that positive outcomes in nursing organizations depend on the adoption of a transformational leadership approach. This style effectively leads nursing staff, addresses staffing concerns, and improves nurse retention [16]. The encouragement and promotion of reasoned thought as a leadership quality have a significant impact on employees' creative behavior and foster collaboration [17]. Empirical data derived from a study encompassing a total of 219 nurses demonstrate that transformational leadership possesses a significant impact on the advancement of OCBs within the nursing profession [18]. Correspondingly, Zurañmi et al. [19] emphasize the intricate connection between transformational leadership and the occurrence of OCBs among nursing staff at the Tapan Regional General Hospital. Moreover, transformational leadership plays a substantial role in fostering the emergence of employee OCBs [20]. As a result, we have formulated the following hypothesis:

H1: Transformational leadership will have a positive effect on OCBs among nurses

1.1.2. Transformational Leadership and Psychological Empowerment. Transformational leaders in nursing play a vital role in supporting change processes that advance

various goals, including enabling high-quality care, ensuring patient safety, and improving the overall quality of life for nurses in the workplace. To achieve these outcomes, managers must provide nurses with the autonomy and freedom to perform their duties in alignment with best practices. This involves empowering nurses to make decisions, take ownership of their work, and contribute to the organization's mission. Psychological empowerment for nurses is not only necessary but also has a significant influence on work performance. When nurses feel empowered, they are more likely to be engaged, motivated, and committed to delivering exceptional care, thereby positively impacting their overall work performance [21]. Given its profound positive effects on both organizations and their personnel, psychological empowerment has emerged as a compelling subject for practical application and scholarly inquiry, driving further exploration and examination in the field [22]. In 1995, Spreitzer was proposed four components to conceptualize psychological empowerment, namely, meaning, competence, self-determination, and impact. Additionally, a resilient and dependable survey was formulated to expedite the economic evaluation of psychological empowerment [23].

The study conducted by Aydogmus et al. [24] sheds light on the relationship between transformational leadership and psychological empowerment, highlighting the significant influence leaders have on employees' perceptions and experiences. Additionally, the research conducted by Cheng et al. [25] further emphasizes the role of transformational leadership as an influential factor in shaping employees' psychological empowerment. These findings contribute to our understanding of how transformational leadership behaviors can foster a sense of empowerment among employees, ultimately influencing their attitudes, behaviors, and overall well-being in the workplace.

Transformational leaders have the remarkable ability to instill faith in their team members' abilities to achieve objectives, thereby strengthening followers' sense of competence. This sense of competence fosters a strong personal dedication towards their objectives and propels individuals with an inner drive, making them less reliant on external oversight to carry out their duties. As a result, the accomplishment of individual goals amplifies one's impact and enhances their sense of autonomy [22]. Furthermore, as transformational leaders, they empower their followers to realize their full potential and instill confidence in their ability to make a positive impact on the organization. Consequently, it is suggested that followers guided by such leaders experience psychological empowerment [26]. Therefore, building on the previous discussion, we developed the following hypothesis:

H2: Transformational leadership and psychological empowerment are positively correlated.

1.1.3. Psychological Empowerment and OCBs. In accordance with the principles of social exchange theory, individuals operating within environments that foster empowerment are inclined to exhibit OCBs [27]. Numerous studies have identified psychological empowerment as a pivotal pathway

leading to the manifestation of OCBs [28, 29]. These studies have found that when individuals perceive themselves as empowered within their organization, they are more likely to engage in behaviors that go beyond their formal job requirements and contribute to the overall well-being of the organization. Furthermore, Singh and Singh [30] conducted a study that revealed organizations fostering a sense of empowerment among their staff members experience positive outcomes, which are manifested in the form of OCBs. This suggests that psychological empowerment plays a crucial role in cultivating an organizational climate that encourages and motivates employees to engage in discretionary behaviors that benefit the organization and its members. Employees' OCBs are positively impacted by psychological empowerment because it creates a favorable work environment that improves their performance outside of their roles [8].

In conclusion, organizations that implement psychological empowerment programs are well-positioned to enhance OCBs and reduce intentions of employee turnover and retention [31]. Empowerment serves as a catalyst for motivating employees to exert their optimal efforts and signifies a heightened organizational commitment to goal achievement [32]. Building on the insights obtained from the aforementioned literature, we propose the following hypothesis:

H3: Psychological empowerment has a positive and significant impact on OCBs among nurses.

1.1.4. Psychological Empowerment as a Mediating Role. Earlier research findings have suggested that the skillful utilization of transformational leadership behaviors, such as idealized influence, intellectual stimulation, and individualized consideration, during organizational tasks can stimulate a sense of psychological empowerment among followers. This, in turn, has the potential to contribute to a higher level of organizational commitment [33, 34]. Empirical studies align with the principles of leadership theory. For instance, transformational leadership theory posits that the manner in which leaders and followers interact during the management of organizational activities can motivate followers to prioritize the interests of the organization over their own [35].

Moreover, in accordance with the psychological empowerment model, intrinsic task motivation has the potential to enhance employees' engagement and satisfaction with their work, irrespective of external rewards. The psychological empowerment model suggests that when employees feel a sense of autonomy, competence, meaningfulness, and impact in their work, they experience intrinsic motivation, which arises from the inherent satisfaction and enjoyment derived from the work itself. This intrinsic motivation is driven by the individual's internal desire to engage in the task and is not contingent on external rewards or incentives [36]. In line with this perspective, we propose that psychological empowerment, which has been found to have a positive correlation with OCBs, is closely linked to transformational leadership.

Transformational leaders, by exhibiting behaviors that inspire and empower their followers, create an environment conducive to psychological empowerment [26]. Furthermore, as job satisfaction arises from the fit between employees' jobs and their job values, fewer satisfied employees tend to perceive their jobs less matched with them and obtain less support (both extrinsic and intrinsic) when performing jobs [37].

Based on these insights, we propose the following mediating hypothesis:

H4: Psychological empowerment mediates the relationship between transformational leadership and OCBs among nurses.

Based on the previous literature review and hypothesis development, the conceptual framework of the present study was developed as shown in Figure 1.

2. Materials and Methods

2.1. Study Design and Participants. This cross-sectional study was conducted at King Khalid Hospital in El-kharij Governorate. This hospital is equipped with high-quality health and medical departments that deliver efficient services to patients across various specialties. These departments include medical, surgical, operating room, radiology, dental, and intensive care units. Additionally, the hospital offers a dedicated section for psychological consultations, staffed by top doctors and psychologists. Furthermore, the hospital has a specialized department for medical endoscopy. The study utilized a convenience sampling method to recruit registered nurses from different age groups and departments within the hospital. The inclusion criteria required participants to be actively engaged in providing direct patient care on a full-time basis. To maintain consistency in the participant group, nursing interns and managers were excluded from the study. Out of the initial 357 nurses approached to participate in the study, a total of 305 nurses completed the self-reported questionnaires, resulting in a response rate of 85.4%.

2.2. Sample Size. The sample size was computed using the formula $n = (Z^2 * \sigma^2) / d^2$, where "n" represents the required sample size, "Z" is the standardized normal deviation corresponding to a 95% confidence level and $\alpha = 0.05$ ($Z = 1.96$ for a two-tailed test), " σ " denotes the expected standard deviation in the population ($\sigma = 0.4$) based on the study by Taghinezhad et al. [38], and "d" signifies the acceptable margin of error for the mean ($d = 0.05$). This calculation initially yielded a minimum sample size of 246, with provision for an anticipated 15% attrition rate. Subsequently, the final sample size was adjusted to 283 nurses.

2.3. Instrumentations. Data for the study were collected using three scales, all of which utilized a five-point Likert scale ranging from "1" representing "strongly disagree" to "5" representing "strongly agree."

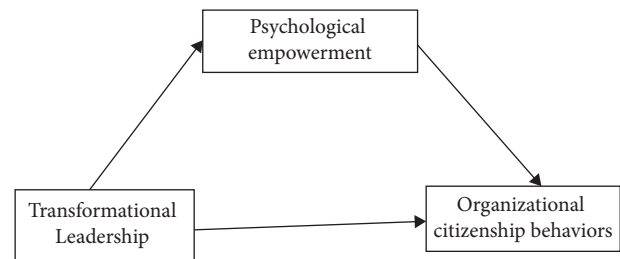


FIGURE 1: Conceptual framework developed for this study.

2.3.1. Global Transformational Leadership Scale. The researchers employed the Global Transformational Leadership Scale developed by Carless in 2000 [38], to measure nurses' perceptions of transformational leadership demonstrated by their immediate leaders or managers. This scale contains seven items that assess four dimensions: idealistic impact, inspirational motivation, individual consideration, and intellectual stimulation and critical thinking. The reliability of the scale in this study was evaluated using Cronbach's alpha, which yielded a value of 0.74, indicating acceptable internal consistency.

2.3.2. Psychological Empowerment Scale. The researchers utilized the Psychological Empowerment Scale developed by Spreitzer [23] to measure the various dimensions of psychological empowerment. This scale consists of twelve items, equally distributed across four dimensions: competence, meaning, self-determination, and impact. The internal consistency of the scale was assessed using Cronbach's alpha, which yielded a value of 0.89 for the total items, indicating high reliability. Furthermore, the subscales of the psychological empowerment scale demonstrated good internal consistency, with Cronbach's alpha values ranging from 0.71 to 0.90.

2.3.3. OCBs Scale. The OCBs scale utilized in this study was developed by Podsakoff and his colleagues [39]. It consists of 12 items that are categorized into three dimensions: helping (6 items), civic virtue (3 items), and compliance (3 items). The internal consistency of the scale was assessed using Cronbach's alpha, which yielded a value of 0.70 for the total items. The subscales of the OCBs scale demonstrated satisfactory internal consistency, with Cronbach's alpha values ranging from 0.71 to 0.75. The utilized English scales demonstrated good reliability and validity in previous studies [40, 41].

The researchers opted to employ the English versions of the measurement scales in light of the fact that the registered nurses participating in the study routinely use English in their clinical practice and research was being conducted in English. Utilizing scales in English helped ensure the validity and reliability of responses by nurses sufficiently proficient in the language both professionally and academically. This approach reinforced the integrity of data collection and subsequent analysis within the study's methodological framework.

2.4. Data Collection. The data collection for this study occurred between March 2023 and August 2023, utilizing self-administered handwritten questionnaires. Participants were recruited through in-person meetings, during which they were provided with comprehensive information about the study, including its objectives, procedures, and their right to withdraw without facing any repercussions. Informed written consent was obtained from all participants before they proceeded to complete the questionnaire. To ensure confidentiality, participants were instructed to submit the completed questionnaires anonymously. Prior to the full implementation of the data collection, a pilot study was conducted with a sample of 29 registered nurses. The purpose of this pilot study was to identify any areas of the survey that required clarification or refinement. This iterative process allowed the researchers to enhance the clarity and user-friendliness of the survey items, thereby promoting the reliability of the data collection process. The estimated time for participants to complete the questionnaire ranged from 15 to 20 minutes. To ensure the accuracy and integrity of the collected data, the researchers conducted a thorough review of each received questionnaire. This rigorous review process was promptly undertaken to address any potential data omissions, inconsistencies, or missing information. By following these meticulous procedures, the researchers aimed to maintain the quality and reliability of the collected data.

The researchers carefully distributed the questionnaires to registered nurses, ensuring coverage across different shifts and working hours. By doing so, they aimed to capture a diverse range of perspectives. To discourage participants from providing hasty and careless responses, the researchers made a deliberate effort to collect the completed questionnaires at the end of the nurses' shifts. This approach allowed participants the autonomy to choose a suitable moment during their working hours to fill out the survey, promoting a conducive environment for thoughtful and thorough responses. The researchers believed that by providing participants with sufficient time and attention to complete the questionnaire, the quality and reliability of the collected data would be enhanced.

2.5. Ethical Considerations. This study obtained ethical approval from the institutional review board at Prince Sattam bin Abdulaziz University, identified by reference number SCBR-042-2023. Participation in the study was voluntary, and informed consent was secured with a guarantee of anonymity. Staff nurses were reassured that their responses would not impact performance evaluations, work status, or salaries. Completed questionnaires were submitted anonymously, and the data were treated confidentially, exclusively for research purposes.

2.6. Statistical Analysis. Data were meticulously organized, categorized, and presented in tables. Descriptive statistics, comprising numbers and percentages, were employed to delineate participants' demographic characteristics. The independent sample *t*-test and ANOVA test were utilized to

compare means across diverse categories pertaining to personal characteristics and various study variables. The reliability of study variables was assessed using the Cronbach alpha test (α). Pearson correlation analysis explored the correlation matrix among different variables and subscales, with the strength of the correlation categorized according to Pearson's correlation coefficient. The process macro version 3.5 model 4 was employed for analyzing one independent variable (transformational leadership), one dependent variable (OCBs), and one mediator (psychological empowerment). The researchers utilized a biased bootstrap 95% confidence interval (CI) to assess the significance of total, direct, and indirect effects. The analysis was conducted using IBM SPSS Statistics 23, with the significance level set at $P < 0.001$.

3. Results

As shown in Table 1, most of the nursing staff were female (69.2%), less than half of them aged between 31 and 40 years, more than half were married (54.8%), two thirds had a bachelor's degree (66.2%), approximately two thirds of them have more than ten years of experience in nursing, while less than half of them usually worked in the morning shift (44.9%). 25.6% of the nursing staff worked in medical units. Finally, there were no statistically significant differences among transformational leadership, OCBs, and psychological empowerment with personal characteristics.

Table 2 demonstrates nurses who recorded mean scores of 3.38, 3.40, and 3.54 for transformational leadership, psychological empowerment, and OCBs, respectively. Among the dimensions of psychological empowerment, the highest mean was observed in the meaning dimension (3.53 ± 0.83). Similarly, the compliance dimension recorded the highest mean for OCBs (3.69 ± 0.60).

The findings in Table 3 reveal a positive correlation between staff nurse's transformational leadership and psychological empowerment ($r = 0.507$, $P < 0.001$), as well as with OCBs ($r = 0.445$, $P < 0.001$). Additionally, a positive correlation was observed between psychological empowerment and OCBs ($r = 0.451$, $P < 0.001$).

Table 4 further illustrates that transformational leadership has a positive impact on psychological empowerment ($B = 0.433$, $p < 0.001$) and OCBs ($B = 0.208$, $p < 0.001$) among the studied nurses. Furthermore, psychological empowerment positively influences OCBs among the participants ($B = 0.254$, $p < 0.001$). Notably, psychological empowerment was identified as a partial mediator in the relationship between transformational leadership and OCBs among the studied nurses ($B = 0.110$, CI: 0.058–0.166).

4. Discussion

The present research study aimed to investigate the relationship between transformational leadership and OCBs in the nursing context, with psychological empowerment acting as a mediating factor.

Our findings demonstrated a positive impact of transformational leadership on OCBs among nursing staff,

TABLE 1: Personal characteristics of the studied nurses and differences in the study variables.

Characteristics	N	%	Transformational leadership	Psychological empowerment	Organizational citizenship behavior
			Mean \pm SD	Mean \pm SD	Mean \pm SD
<i>Age (years)</i>					
20–30	73	23.9	3.25 \pm 0.75	3.30 \pm 0.64	3.48 \pm 0.53
31–40	134	43.9	3.45 \pm 0.74	3.50 \pm 0.65	3.58 \pm 0.54
41–50	85	27.9	3.35 \pm 0.75	3.34 \pm 0.61	3.50 \pm 0.54
<50	13	4.3	3.45 \pm 0.43	3.41 \pm 0.53	3.64 \pm 0.37
<i>f/p</i>			1.31/0.27	1.92/0.13	0.79/0.50
<i>Gender</i>					
Male	94	30.8	3.29 \pm 0.71	3.45 \pm 0.60	3.52 \pm 0.55
Female	211	69.2	3.41 \pm 0.75	3.39 \pm 0.65	3.54 \pm 0.53
<i>t/p</i>			1.08/0.16	0.75/0.46	0.35/0.73
<i>Marital status</i>					
Single	112	36.7	3.47 \pm 0.58	3.43 \pm 0.55	3.49 \pm 0.4
Married	167	54.8	3.34 \pm 0.82	3.39 \pm 0.70	3.57 \pm 0.61
Divorced	20	6.6	3.15 \pm 0.81	3.48 \pm 0.57	3.53 \pm 0.56
Widowed	6	2.0	3.28 \pm 0.65	2.99 \pm 0.28	3.40 \pm 0.31
<i>f/p</i>			1.43/0.23	1.04/0.37	0.56/0.64
<i>Educational level</i>					
Technical education	62	20.3	3.28 \pm 0.65	3.41 \pm 0.66	3.57 \pm 0.43
Bachelor's degree	202	66.2	3.38 \pm 0.79	3.39 \pm 0.65	3.51 \pm 0.58
Postgraduate degree	41	13.4	3.51 \pm 0.61	3.46 \pm 0.53	3.60 \pm 0.41
<i>f/p</i>			1.14/0.32	0.20/0.82	0.62/0.54
<i>Years of experience</i>					
<5	45	14.8	3.19 \pm 0.73	3.26 \pm 0.69	3.42 \pm 0.53
6–10	78	25.6	3.48 \pm 0.79	3.47 \pm 0.68	3.57 \pm 0.59
10–15	93	30.5	3.40 \pm 0.74	3.49 \pm 0.62	3.53 \pm 0.51
>15	89	29.2	3.37 \pm 0.71	3.34 \pm 0.57	3.56 \pm 0.51
<i>f/p</i>			1.49/0.22	1.94/0.12	0.88/0.45
<i>Shift</i>					
Morning	137	44.9	3.35 \pm 0.81	3.41 \pm 0.68	3.53 \pm 0.58
Afternoon	53	17.4	3.35 \pm 0.71	3.38 \pm 0.56	3.54 \pm 0.42
Night	48	15.7	3.46 \pm 0.74	3.49 \pm 0.63	3.55 \pm 0.56
Morning and evening	67	22.0	3.38 \pm 0.64	3.34 \pm 0.61	3.53 \pm 0.49
<i>f/p</i>			0.29/0.84	0.58/0.63	0.01/0.99
<i>Working unit</i>					
Emergency	45	14.8	3.35 \pm 0.69	3.37 \pm 0.60	3.48 \pm 0.48
Medical	78	25.6	3.34 \pm 0.84	3.42 \pm 0.67	3.51 \pm 0.56
Surgical	64	21.0	3.41 \pm 0.78	3.45 \pm 0.68	3.51 \pm 0.55
Dialysis	38	12.5	3.39 \pm 0.75	3.41 \pm 0.72	3.51 \pm 0.59
Outpatient	42	13.8	3.36 \pm 0.56	3.47 \pm 0.48	3.59 \pm 0.56
ICU	26	8.5	3.35 \pm 0.73	3.17 \pm 0.63	3.65 \pm 0.38
Operative	12	3.9	3.48 \pm 0.69	3.39 \pm 0.51	3.69 \pm 0.53
<i>f/p</i>			0.11/0.99	0.78/0.59	0.58/0.75

*Significant ($P < 0.05$). (F) ANOVA test. (t) *t*-test.

supported H1. This is attributable to the development of a supportive work environment characterized by open communication, collaboration, and mutual respect. In such environments, employees are more likely to engage in OCBs, as they experience a stronger sense of belonging and commitment to the organization's goals. This, in turn, leads to improved job satisfaction and overall organizational performance [7, 16, 32].

Our study aligns with the findings of Qiu et al. [42], who conducted research across eight hospitals in China and revealed that a leadership style characterized by role modeling, integrity, and ethics had a direct impact on OCBs among nursing staff. Similarly, a study conducted by

Aloustani et al. [43] among nurses from twelve teaching hospitals in Tehran demonstrated that a leadership style that promotes an ethical climate has the ability to enhance OCBs. This indicates that when nurses perceive their leaders as ethical and morally upright, they are more likely to exhibit behaviors that benefit the organization as a whole.

Furthermore, the study by López-Ibort et al. [44] in Spain, which included nurses and supervisors from nine public hospitals in the autonomous community of Aragon, revealed that a leadership style that fosters quality nurse-supervisor relationships encourages OCBs among participants. Rimatanti et al. [45] also found a positive and significant effect of transformational leadership on OCBs

TABLE 2: Descriptive statistics of the study variables.

The study variables	Min-max	Mean \pm SD
Transformational leadership	1.14–4.86	3.38 \pm 0.74
Psychological empowerment	1.42–4.67	3.40 \pm 0.64
Meaning	1.00–5.00	3.53 \pm 0.83
Competence	1.00–5.00	3.37 \pm 0.84
Self-determination	1.00–5.00	3.40 \pm 0.87
Impact	1.00–5.00	3.32 \pm 0.84
OCBs	1.67–4.92	3.54 \pm 0.53
Helping	1.17–4.83	3.52 \pm 0.63
Civic virtue	1.00–5.00	3.41 \pm 0.80
Compliance	2.00–5.00	3.69 \pm 0.60

OCBs: organizational citizenship behaviors.

TABLE 3: Correlation among the study variables.

The study variables	1	2	3	4	5	6	7	8	9	10
(1) Transformational leadership	1.00									
(2) Psychological empowerment	0.507***	1.00								
(3) Meaning	0.298***	0.697***	1.00							
(4) Competence	0.424***	0.784***	0.372***	1.00						
(5) Self-determination	0.464***	0.782***	0.367***	0.531***	1.00					
(6) Impact	0.340***	0.756***	0.376***	0.468***	0.444***	1.00				
(7) OCBs	0.445***	0.451***	0.261***	0.362***	0.445***	0.289***	1.00			
(8) Helping	0.366***	0.394***	0.217***	0.326***	0.397***	0.244***	0.863***	1.00		
(9) Civic virtue	0.385***	0.364***	0.226***	0.290***	0.339***	0.241***	0.725***	0.349***	1.00	
(10) Compliance	0.294***	0.285***	0.167***	0.212***	0.289***	0.191***	0.764***	0.495***	0.499***	1.00

OCBs: organizational citizenship behaviors *** $p < 0.001$.

TABLE 4: Mediating effect of psychological empowerment between transformational leadership and organizational citizenship behavior.

	<i>B</i>	SE	<i>t</i>	LL CI	UL CI
Transformational leadership to psychological empowerment	0.433	0.042	10.227***	0.350	0.517
Transformational leadership to OCBs	0.208	0.041	5.095***	0.128	0.289
Psychological empowerment to OCBs	0.254	0.048	5.307***	0.160	0.348
Total effect	0.319	0.037	8.648***	0.246	0.391
Direct	0.209	0.041	5.095***	0.128	0.289
Indirect	0.110	0.028		0.058	0.166

OCBs: organizational citizenship behaviors/*** $p < 0.001$.

among a purposive sample of nurses in Indonesia. Similarly, Hall [46] conducted a study among registered nurses in the United States and found that leadership skills play a crucial role in promoting OCBs. Moreover, transformational leadership in nursing unit managers improves nurses' empowerment, performance, job satisfaction, and organizational commitment [47]. However, it is important to note that the study by Kim [48] in South Korea found no significant influence of transformational leadership on OCBs among employees of the Gwangju Metropolitan City government. This discrepancy may be attributed to cultural or contextual differences between the nursing context and the government setting.

The study findings revealed that transformational leadership had a significant and positive relationship with psychological empowerment, supporting H2. This implies that transformational leaders foster supportive and inclusive environments that prioritize the growth and development of

employees. In such environments, individuals feel valued, acknowledged, and supported in their personal and professional journeys. These elements significantly contribute to the enhancement of employees' sense of competence, autonomy, and self-determination, which are fundamental aspects of psychological empowerment [49]. Moreover, transformational leaders actively engage in coaching and mentoring behaviors, offering valuable guidance and feedback that aid in the skill-building and confidence-boosting processes of employees. This, in turn, further strengthens their overall sense of empowerment [50].

These findings are consistent with the meta-analysis study conducted by Schermuly et al. [22], which investigated the effects of various leadership styles on psychological empowerment. Their study found that transformational leadership contributes to psychological empowerment. Additionally, the Chinese study by Hua et al. [51] revealed that nurse managers who adopt

a transformational leadership style enhance psychological empowerment among nurses. The mediation study of Zhang et al. [52] found that transformational leadership had a positive and significant impact on psychological empowerment.

The findings of the present study showed that psychological empowerment has a positive and significant impact on OCBs among nurses, supporting H3. This may be due to psychological empowerment is associated with higher levels of job satisfaction and organizational commitment among nurses, which further encourages them to exhibit OCBs as a form of positive citizenship behavior that enhances the overall effectiveness and success of the organization [53, 54]. Our findings are supported by the study of Turnipseed and VandeWaa [55] that was carried out among nurses in a medium-size urban general hospital and revealed that there are differential relationships between the dimensions of psychological empowerment and the dimensions of OCBs. Also, the meditation study of AlHammadi and Elanain [12] revealed that psychological empowerment had positive and direct impact on OCBs. Moreover, Jafari et al. [29] found that psychological empowerment associated positively with positive organizational behavior among nurses working in university hospitals affiliated to the Kermanshah University of Medical Sciences in Iran.

Our findings revealed that psychological empowerment mediates the relationship between transformational leadership and OCBs among nurses, supporting H4 and indicating that transformational leaders may foster a work environment where nurses feel empowered to contribute positively to the organization, leading to increased OCBs. These findings in the same line with the study of Saira et al. [8] revealed that transformational leadership positively impacts employee outcomes like OCBs and turnover intention through increased psychological empowerment. Similarly, in north-eastern United States, Dust et al. [56] found that psychological empowerment mediated relationships between transformational leadership and employee task performance and OCBs. Moreover, Cheng et al. [25] showed that transformational leadership shows positive and negative effects on deep acting and surface acting, respectively. The positive effect on deep acting is partially mediated by psychological empowerment, while the negative effect on surface acting is fully mediated by psychological empowerment. The study of Shapira-Lishchinsky and Benoliel [57] found that nurses' psychological empowerment and their head nurses' authentic leadership positively impact their OCBs, tardiness, absenteeism, and intent to leave the hospital. The study of Han et al. [58] indicates a significant direct effect of transformational leadership on psychological empowerment, organizational commitment, and OCBs. Moreover, transformational leadership also shows an indirect effect on employees' OCBs, which, in turn, is identified as the primary factor that influences knowledge sharing among employees of five large companies in South Korea. Huang et al. [59] found that psychological empowerment positively mediated the relationships between both transformational and contingent reward leaderships and organizational commitment among university members in China.

Moreover, psychological empowerment plays a crucial role in the relationship between transformational leadership and positive consequences in nursing context. For instance, the investigation of Masood and Afsar [60] found that transformational leadership fosters innovative work behavior among nursing staff by increasing psychological empowerment, intrinsic motivation, and knowledge sharing behavior. Also, the study of Zhang et al. [52] found that transformational leadership and psychological empowerment significantly improve nurses' innovative behavior during the COVID-19 pandemic.

5. Conclusion

In conclusion, his study emphasizes the role of psychological empowerment as a mediating factor in the relationship between transformational leadership and OCBs among nurses. It underscores how leadership styles shape organizational culture and employee behaviors. Organizations that prioritize and nurture transformational leadership are positioned to witness increased levels of voluntary, positive behaviors, which ultimately enhance the overall success and well-being of the organization.

5.1. Limitations of the Study. This study is limited in its scope to a specific setting and a distinct group of nurses, which may restrict the generalizability of the findings to other healthcare contexts, nursing professions, or diverse healthcare professionals. Therefore, future research should aim to replicate the current study in diverse healthcare settings and among different healthcare professionals to assess the generalizability of the observed relationships. The utilization of a cross-sectional design captures only a snapshot of the relationships at a specific moment, cautioning against drawing causal conclusions. To gain more insight into the causal dynamics over time, longitudinal studies could be employed. Additionally, supplementing self-reported data with objective performance measures or supervisor ratings would enhance the validity of the study. The reliance on self-reported data through questionnaires introduces the potential for response bias, as participants may provide socially desirable answers or not fully reflect their actual behaviors. To address this limitation, incorporating a mixed-methods approach that includes qualitative insights could provide a more comprehensive understanding of the subjective experiences of nurses and leaders. Lastly, conducting intervention studies focused on leadership training programs may offer practical insights into enhancing transformational leadership behaviors and their subsequent impact on psychological empowerment and OCBs.

5.2. Implications of the Study. Nurse managers should cultivate and strengthen their transformational leadership behaviors to empower nurses psychologically, thereby fostering a positive workplace culture and promoting OCBs. To achieve this, the development of training programs focused on enhancing psychological empowerment among nurses is

recommended. These programs should emphasize the significance of nurses' roles, provide opportunities for skill development, and promote autonomy.

Data Availability

The data that support the findings of this study are available on reasonable request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the research, authorship, and/or publication of this article.

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Research Article

Trends and Hotspots in Nursing Theory Research Published from 1990 to 2022: A Web of Science-Based Bibliometric Analysis

Ruifang Zhu ^{1,2} Qian Wang,² Jun Zhang,² Weiliang Liu,² Caizhen Ma,² Shifan Han ^{1,2}
and Zhiguang Duan ²

¹Editorial Office, First Hospital of Shanxi Medical University, Taiyuan 030001, Shanxi, China

²School of Nursing, Shanxi Medical University, Taiyuan 030001, Shanxi, China

Correspondence should be addressed to Zhiguang Duan; dzg528@sxmu.edu.cn

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Background and Purpose. Nursing theory can provide a framework for analyzing and solving problems in nursing research, nursing management, nursing education, and clinical nursing. The development of nursing theory has been more than one hundred years and has gradually developed mature. However, no bibliometric analysis has been conducted on nursing theory. *Methods.* This study adopted bibliometric approaches and analyzed the nursing theory research literature included in the Web of Science database during the 33 years between 1990 and 2022 using VOSviewer software. The source countries and regions, subject categories and distributions of institutions/units, journals, and highly productive authors of 23,180 nursing theory publications from the past 33 years were analyzed. The top ten funding agencies of nursing theory literature were also analyzed. Cluster and topic evolution analyses were performed on high-frequency keywords in nursing theory literature. *Results.* Historical trends in nursing theory were explored based on the number of articles published each year. The authoritative academic journals of nursing theory were identified based on the number of articles published, and the leaders of nursing theory and their academic research teams were identified based on the authors and their institutions. Moreover, the research hotspots and development trends in nursing theory were explored based on keyword clustering and topic evolution analysis. Thus, it is helpful to guide nursing practice and effectively solve nursing problems in nursing management. *Conclusion.* Research on nursing theory has been increasingly applied in clinical practice and tested or verified through clinical interventions in treating diseases. Theoretical research is inseparable from the development of nursing education. Moreover, research methods should be specific and diverse. Further improvement of theories depends on patient-centered clinical practice. Therefore, this study plays an important role in the continuous enrichment and development of nursing theory, which is conducive to further promoting the progress of nursing management and nursing discipline.

1. Introduction

Nursing theory can function as a description, an explanation, guidance, or a prediction. Specifically, it can describe situations in nursing disciplines, explain relationships between phenomena, guide nursing practice, and predict nursing outcomes. Moreover, it may also provide a framework for analyzing and solving problems in nursing research, nursing management, nursing education, and clinical nursing [1]. Nursing theory has been developed for over a century, and relatively mature nursing theories, construction ideas, and methods have been established [2].

Bibliometrics visualize research results through literature analysis and bibliometric mapping to identify major trends in research development. As an effective tool for Big Data processing, bibliometrics has been widely applied in qualitative assessments of the development status and academic influence of a specific field [3]. However, no systematic bibliometric analysis of literature related to nursing theory has been conducted.

The Web of Science (WoS) database has adopted a set of strict selection procedures and an objective evaluation process. It includes the most authoritative and influential scholars, journals, and literature in various disciplines.

Moreover, it clearly demonstrates a division of disciplines. Therefore, this study analyzed relevant literature on nursing theory research from the past 33 years, using the WoS database and the visualization analysis software VOSviewer, to understand the growth patterns, research hotspots, and development trends of nursing theory research publications worldwide, which can serve as a reference to promote clinical nursing theory research.

2. Data and Methods

2.1. Data Source. WoS is the largest academic literature database covering the largest number of disciplines in the international academic community [4]. The journals included in the Science Citation Index Expanded (SCI-E) and Social Science Citation Index (SSCI) are mainly based on their impact factor (IF), which reflects the average citation frequency of journal articles. However, the journals included in the Arts and Humanities Citation Index (A&HCI) are based on the peer review results of major scholars in related disciplines worldwide. Therefore, the WoS core collection (SCI-E, SSCI, and A&HCI) database was selected, and an advanced search was performed. The search formula was set as TS=(nursing OR nurse OR nurses OR care OR caring) and TS=(theory OR theories); language type: English; document type: article & review; and time range: January 1, 1990–December 31, 2022 (retrieval date was January 6, 2022). In total, 44465 pieces of bibliographic information were downloaded. The downloaded bibliography was imported using NoteExpress software, and the duplicate content-checking function was used to remove duplicate documents. Incomplete bibliographies, character profiles, hospital or institution introductions, manuscript appointments, and documents with irrelevant research topics were eliminated after two investigators read the titles, abstracts, keywords, and other information, resulting in a final total of 23,180 documents. Data collection flow chart is shown in Figure 1.

2.2. Analysis Methods. The bibliometric analysis approach is based on bibliometrics theory and uses the literature information in the research field for analysis and investigation. This approach is currently widely applied in scientific research that uses existing literature as the research object. VOSviewer is a visualization tool for creating network diagrams that can perform quantitative analysis of literature and draw visual diagrams to reveal research hotspots and trends in a certain field. Each node in the visualization map represents a cited keyword, and the size of the node indicates the citation frequency. Connections between two nodes indicate the cocitation of a keyword, and the connection's thickness reflects the strength of that link. The distance between two nodes indicates a correlation in the co-occurrence network.

3. Results

3.1. Number of Publications and Cumulative Publications on Nursing Theory. In the past 33 years, 23,180 articles related to nursing theory have been published and included in the WoS database. Figure 2 shows the general trend. In 1990, the

database included only two publications, which increased to 154 articles by 1995, while the number of publications declined in 1996 and 1997. Compared with the number of publications in 1997, the number was higher from 1998 to 2011. During this period, the number of publications increased yearly until it reached 849 in 2011 and then fell again in 2012. In 2013, the number of publications gradually increased again, reaching its highest point in 2021, with an annual publication volume of 2177 articles and 1880 articles in 2022, which, despite being slightly lower than 2021, was still over twice the volume of ten years prior.

3.2. Distribution of Country (Region) of Nursing Theory Literature. A total of 130 countries (regions) had publications on nursing theory, with relatively concentrated distribution (Table 1), mainly in North America and Europe, such as the United States, the United Kingdom, Canada, and the Netherlands, as well as Australia. The United States provided 8,745 published articles, far exceeding other countries and accounting for 37.73% of the total publications. The United Kingdom, Canada, Australia, and the Netherlands accounted for approximately 13.95%, 8.81%, 7.56%, and 3.59% of the published articles, respectively. Regarding the number of published articles, the top five countries accounted for 71.64% of the total number of publications in nursing theory. A total of 808 articles on nursing theory were published in China (ranking sixth overall).

3.3. Subject Categories in Nursing Theory Publications. The published literature related to nursing theory included a total of 141 disciplines, with 12730 publications involving one discipline, 7983 publications involving two disciplines, 1710 publications involving three disciplines, and 99 publications involving four disciplines (Table 2). Among all the included disciplines, the top five were nursing, health care sciences and services, public, environmental, occupational health, psychology, and medicine general internal, as shown in Table 3.

3.4. Distribution of Institutions (Units) of Nursing Theory Publications. A total of 753 institutions (units) have published literature on nursing theory, and the top 30 institutions (units) and their cumulative number of publications are shown in Table 4. Most of the top 20 institutions in terms of publication volume were from the United States, the United Kingdom, Canada, and Australia. The University of Toronto and University of Alberta in Canada ranked highest, with 128 and 109 articles, respectively, followed by the University of Washington, University of North Carolina, University of California, San Francisco, and University of Michigan.

3.5. Journal Distribution of Nursing Theory Publications. The 23,180 research articles on nursing theory were published across 204 journals. The top 30 journals are listed in Table 5. The *Journal of Advanced Nursing* (IF 3.057) had the largest collection of nursing theory-related articles, with 985

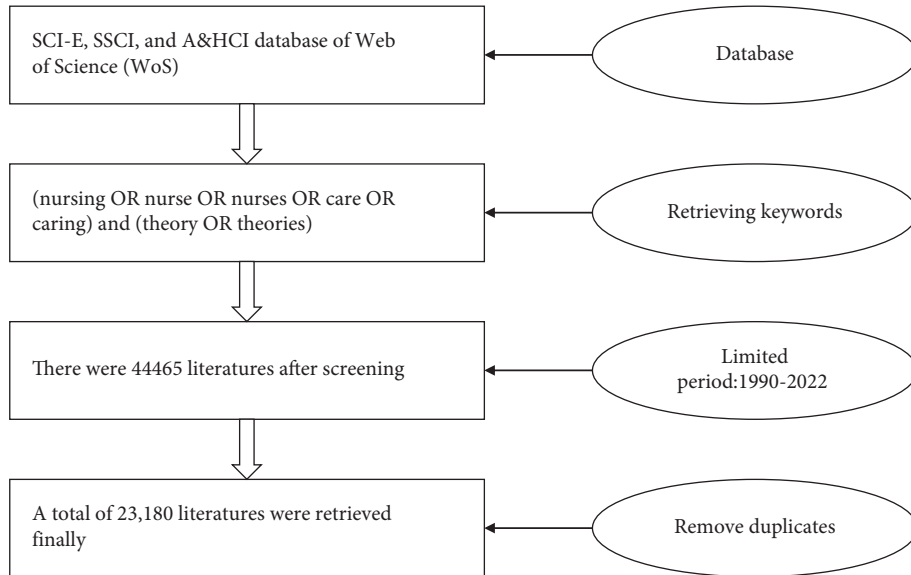


FIGURE 1: Flow chart of data collection.

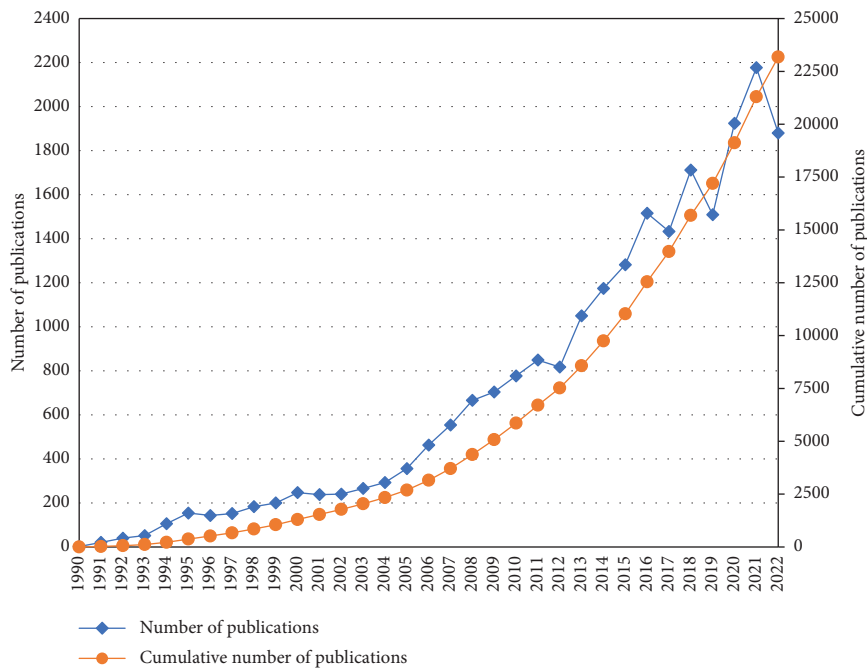


FIGURE 2: Number of publications and cumulative number of publications on nursing theory in the WoS database from 1990 to 2022.

articles published in 33 years. This was followed by the *Journal of Clinical Nursing*, *Nurse Education Today*, and *BMC Health Services Research*, each with collections of over 450 relevant publications, with IFs of 4.423, 3.906, and 2.908, respectively. According to Bradford’s law [5] (i.e., if the journals are divided into three levels based on the number of publications on a certain subject within a certain period of time to make the number of relevant papers contained in each level equal, that is, exactly equal to one-third of the total number of articles on this subject published in all journals), it can be seen that the articles at the first level (core level) came from n1 journals, which are small in number but with

the highest efficiency. After calculation, the core journals publishing articles on nursing theory were the top 30 journals, which included 7,766 related articles, accounting for approximately 33.50% of the total number of articles.

3.6. *Distribution of Highly Productive Authors in Nursing Theory Publications.* A total of 57,853 authors were included in the publications on nursing theory, and Table 6 lists the top 20 most active authors. The most productive author of research articles on nursing theory was France Légaré from the Department of Family Medicine and Emergency Medicine, Laval University, Canada, who has published 31

TABLE 1: List of the top 30 countries (regions) in terms of the cumulative number of publications in WoS from 1990 to 2022.

No	Country	Documents
1	USA	8745
2	England	2681
3	Canada	2043
4	Australia	1753
5	Netherlands	832
6	China	808
7	Sweden	465
8	Norway	442
9	Scotland	382
10	Germany	376
11	Singapore	301
12	Spain	255
13	Denmark	227
14	Brazil	202
15	Italy	195
16	France	177
17	Israel	165
18	Finland	149
19	Belgium	145
20	South Africa	133
21	Japan	129
22	Ireland	124
23	New Zealand	120
24	Iran	117
25	Wales	105
26	South Korea	104
27	Switzerland	104
28	India	87
29	Turkey	77
30	Northern Ireland	66

TABLE 2: Subject categories involved in WoS publications from 1990 to 2022.

No	Subject category	Documents
1	4	99
2	3	1710
3	2	7983
4	1	12730

related articles, followed by Jeremy M. Grimshaw from the Faculty of Medicine, University of Ottawa, Canada, who has published 28 articles, and Susan Michie from the Department of Clinical, Educational, and Health Psychology at the University College London; Marie Johnston from the Health Psychology Group at the University of Aberdeen; and Barbara Riegel from the School of Nursing at the University of Pennsylvania, who have all published more than 20 related articles. An analysis of cooperative research of the top 80 authors is shown in Figure 3. Most authors shared connections, indicating the establishment of cooperative relationships with a small number of noncollaborators around the cooperative network [6]. The closeness of the cooperative relationships between authors can be seen from the network density. The top ten most highly productive authors all had collaborators, indicating the vital importance of cooperation between researchers.

TABLE 3: Top 30 disciplines involved in WoS publications from 1990 to 2022.

No	Subject	Documents
1	Nursing	4016
2	Health care sciences & services	2031
3	Public, environmental, & occupational health	1939
4	Psychology	1526
5	Medicine general internal	1129
6	Education & educational research	926
7	Geriatrics & gerontology	883
8	Social sciences-other topics	784
9	Business & economics	693
10	Computer science	643
11	Psychiatry	523
12	Family studies	491
13	Environmental sciences & ecology	437
14	Oncology	406
15	Information science & library science	323
16	Social work	301
17	Engineering	251
18	Neurosciences & neurology	246
19	Rehabilitation	231
20	Behavioral sciences	204
21	Pediatrics	173
22	Sociology	165
23	Dentistry, oral surgery, & medicine	145
24	Life sciences & biomedicine-other topics	137
25	Obstetrics & gynecology	116
26	Chemistry	95
27	Research & experimental medicine	93
28	Communication	89
29	Cardiovascular system & cardiology	88
30	Anthropology	85

3.7. *Top 10 Funding Organizations for Publications on Nursing Theory.* Scientific research funds may significantly promote the development of health care, and the funded research articles may reflect the latest scientific research level to a certain extent and are highly informative documents. The science funding system has become a strong driving force for the rapid development of nursing research, has produced excellent output, and has contributed greatly to scientific research articles [7]. Among the 23,180 publications related to nursing theory, 18,966 were funded, involving 197 funding categories in total. Table 7 shows the top ten funding agencies. The US Department of Health and Human Services funded the largest number of nursing theory publications, followed by the US National Institutes of Health, Canadian Institutes of Health Research, National Natural Science Foundation of China, and UK National Institute for Health and Care Research.

3.8. *Co-Occurrence Analysis and Coword Clustering Analysis of High-Frequency Keywords in Nursing Theory Publications.* Coword clustering is a multivariate statistical method that measures the relationships between data and provides classifications based on similarities between index data. According to bibliometrics principles, no uniform standards are placed on the number of high-frequency words in coword clustering analysis. Should the number of high-

TABLE 4: List of the top 30 institutions (units) of the cumulative number of publications in WoS from 1990 to 2022.

No	Organization	Country	Documents
1	University of Toronto	Canada	128
2	University of Alberta	Canada	109
3	University of Washington	United States of America	108
5	University of North Carolina	United States of America	104
6	University of California, San Francisco	United States of America	103
7	University of Michigan	United States of America	99
8	Monash University	Australia	98
9	University of Wisconsin	United States of America	95
10	University of Pennsylvania	United States of America	94
11	University of Illinois	United States of America	92
12	Karolinska Institute	Sweden	89
13	University of Sydney	Australia	85
14	University of British Columbia	Canada	83
15	King's College London	United Kingdom	80
16	McMaster University	United Kingdom	79
17	University of Missouri	United States of America	75
18	University of California, Los Angeles	United States of America	74
19	University of Nottingham	United Kingdom	71
20	University of Gothenburg	Sweden	70
21	University of Sheffield	United Kingdom	67
22	University of Minnesota	United States of America	65
23	University of Oslo	Norway	61
24	Linköping University	Sweden	59
25	Columbia University	United States of America	58
26	University of Melbourne	Australia	57
27	University of Sao Paulo	Brazil	56
28	Boston University	United States of America	55
29	University of Queensland	Australia	54
30	McGill University	Canada	52

frequency words be too small, it would be unable to reflect the structure of the subject. Conversely, a selection range that is too large would interfere with the analysis. At present, words with a cumulative frequency reaching approximately 40% of the total frequency are generally selected as high-frequency words [8]. In this study, 23,180 nursing theory-related publications in 33 years included a total of 47,365 keywords. After thorough consideration of expert advice and multiple adjustments, keywords with a frequency greater than or equal to 80 were selected (125 keywords) to plot the co-occurrence network of high-frequency keywords in nursing theory publications from 1990 to 2022 found on WoS (Figure 4). The research hotspots were summarized based on specific literature content, co-occurrence of high-frequency keywords, teaching experience, clinical experience, research experience, and the software's clustering function to ultimately obtain seven hotspots in nursing theory research from 1990 to 2022 as follows: primary health care, psychological ethics, social support, nursing intervention, nursing education and research, older people and chronic diseases, and quality of life (Table 8).

3.9. Topic Evolution of Nursing Theory Publications

3.9.1. 1990–2000. A total of 4047 keywords were identified. In this study, keywords (65) with a frequency greater than or equal to seven were selected to plot the co-occurrence network of high-frequency keywords in nursing theory

publications in WoS from 1990 to 2000 (Figure 5). The research hotspots were summarized based on specific literature content, co-occurrence of high-frequency keywords, teaching experience, clinical experience, research experience, and the software's clustering function to ultimately obtain 10 hotspots of nursing theory research from 1990 to 2022 as follows: psychology, ethics, family nursing, nursing outcomes, quality of life, primary health care, children and adolescents, nursing research, theoretical models, and cancer and chronic diseases (Table 9).

3.9.2. 2001–2011. A total of 14,367 keywords were identified. In this study, keywords (135) with a frequency greater than or equal to 20 were selected to plot the co-occurrence network of high-frequency keywords in nursing theory publications in WoS from 2001 to 2011 (Figure 6). The research hotspots were summarized based on specific literature content, co-occurrence of high-frequency keywords, teaching experience, clinical experience, research experience, and the software's clustering function to ultimately obtain 15 hotspots of nursing theory research from 2001 to 2011 as follows: health promotion, nurse decision-making, evidence-based practice, methodology, long-term care, parental care, women's health, home-based care, hospice care, older people, sexually-transmitted diseases (STDs), qualitative research, assessment, nursing practice, and philosophy (Table 10).

TABLE 5: Top 30 journals in terms of the cumulative number of publications in WoS from 1990 to 2022.

No	Journal	Publications
1	Journal of advanced nursing	1202
2	Journal of clinical nursing	588
3	Nurse education today	544
4	BMC health services research	514
5	Social science & medicine	506
6	Nursing science quarterly	415
7	Qualitative health research	362
8	BMJ open	361
9	Advances in nursing science	276
10	International journal of nursing studies	225
11	Scandinavian journal of caring sciences	204
12	Implementation science	186
13	Journal of evaluation in clinical practice	170
14	Midwifery	161
15	Journal of medical internet research	158
16	BMC public health	153
17	Nursing ethics	147
18	Patient education and counseling	145
19	PLOS one	140
20	Children and youth services review	132
21	Journal of nursing management	129
22	Revista latino-americana de enfermagem	128
23	Nursing inquiry	123
24	Journal of general internal medicine	120
25	Cancer nursing	117
26	British journal of social work	115
27	Journal of interprofessional care	114
28	Academic medicine	113
29	Journal of nursing scholarship	111
30	Revista da escola de enfermagem da usp	107

3.9.3. 2012–2022. A total of 30,457 keywords were identified. In this study, keywords (121) with a frequency greater than or equal to 40 were selected to plot the co-occurrence network of high-frequency keywords of nursing theory publications in WoS from 2012 to 2022 (Figure 7). The research hotspots were summarized based on specific literature content, co-occurrence of high-frequency keywords, teaching experience, clinical experience, research experience, and the software's clustering function to ultimately obtain eight hotspots of nursing theory research from 2012 to 2022 as follows: patient-centered, grounded theory, psychological ethics, nursing education, nursing intervention, nursing theory, quality of life, and aging (Table 11).

4. Discussion

4.1. *International Research on Nursing Theory Has Been Active.* Nursing is an interdisciplinary subject [9]. The number of publications related to nursing theory has shown an annual increase in recent years, with nearly 10,000 nursing theory publications involving more than two disciplines. The top eight journals with the highest number of publications are the *Journal of Advanced Nursing* (IF 3.057), *Journal of Clinical Nursing* (IF 4.423), *Nurse Education Today* (IF 3.906), *BMC Health Services Research* (IF 2.908),

Social Science & Medicine (IF 5.379), *Nursing Science Quarterly* (IF 0.833), *Qualitative Health Research* (IF 4.233), and *BMJ Open* (IF 3.007), with a cumulative percentage of 19.38%. The latest research findings of nursing theory may be learned and drawn on by paying more attention to these journals.

4.2. *The United States Has the Leading Nursing Theory Research Globally.* Foreign research institutions with publications on nursing theory were mainly found to be in economically developed countries, such as the United States and some European countries. Over 90% of the top 20 most highly productive authors were from universities and affiliated teaching hospitals. Over one-third of the foreign nursing theory research articles were from the United States. These publications received the most funding from the United States Health and Human Services Department and the National Institutes of Health, showing that the nursing theory research in the United States is at the forefront of the world, leading the developmental trends in nursing theory today.

4.3. *Cooperative Research Will Be the Trend for Future Nursing Theory Studies.* Scientific research cooperation is an effort that can significantly improve scientific research capacity without much investment and has become the mainstream method of social science research today. This study's results show that highly productive authors generally have collaborators, indicating the importance of cooperation among researchers.

4.4. *Cluster Analysis of High-Frequency Keywords Revealed That Nursing Theory Research Tends toward Focusing on Clinical Application and Verification.* Keywords are the natural language that reflects the core content of research. The more keywords appear in a document, the more the main research content can be represented. The more the number of co-occurrences of two high-frequency keywords, the stronger the association between the two. After clustering, the keywords may further reflect the focus of the research field and the academic topics in which researchers are interested.

We summarized the research hotspots based on the specific literature content and keyword cluster analysis. Finally, seven hot categories of nursing theory research from 1990 to 2022 formed, including primary health care, psychological ethics, social support, nursing intervention, nursing education and research, older people and chronic diseases, and quality of life. Nursing theory research has also focused on psychological ethics and social support on top of meeting patients' most basic primary health care requirements. There is more and more research on nursing theories, and a variety of nursing theories have been formed, such as Oram's self-care theory, Erickson's psychosocial development theory, and Piaget's cognitive development theory, which effectively guide clinical nursing practice and have been verified and tested in the process of clinical

TABLE 6: Top 20 highly productive authors in terms of the cumulative number of publications in WoS from 1990 to 2022.

No	Author	Institution	Publications
1	Légaré, France	Department of Family Medicine and Emergency Medicine, Laval University, 1050, Avenue de la Médecine, Québec, QC, G1V 0A6 Canada	31
2	Grimshaw, Jeremy M.	Centre for Implementation Research, Ottawa Hospital Research Institute - General Campus, Ottawa, Ontario, Canada; Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada	28
3	Francis, Jill J.	Centre for Implementation Research, Ottawa Hospital Research Institute - General Campus, Ottawa, Ontario, Canada; School of Health Sciences, University of Melbourne, Melbourne, Victoria, Australia	25
4	Michie, Susan	Department of Clinical, Educational and Health Psychology, Centre for Behaviour Change, University College London, London, WC1E 7HB, UK	24
5	Johnston, Marie	Health Psychology Group, University of Aberdeen, Aberdeen, AB25 2ZD, Scotland, UK	21
6	Lingard, Lorelei	Centre for Education Research & Innovation, Schulich School of Medicine & Dentistry, and Professor Faculty of Education, Western University, London, Ontario, Canada	21
7	Riegel, Barbara	School of Nursing, University of Pennsylvania, Philadelphia	20
8	Greenhalgh, Trisha	Nuffield Department of Primary Care Health Sciences, University of Oxford, Radcliffe Primary Care Building, Radcliffe Observatory Quarter, Oxford, UK	18
9	Presseau, Justin	Centre for Implementation Research, Ottawa Hospital Research Institute, Ottawa, Canada; School of Epidemiology & Public Health, University of Ottawa, Ottawa, Canada; School of Psychology, University of Ottawa, Ottawa, Canada	17
10	Eccles, Martin P.	Institute of Health and Society, Newcastle University, Baddiley-Clark Building, Richardson Road, Newcastle Upon Tyne, NE2 4AX, UK	17
11	Vellone, Ercole	Department of Biomedicine and Prevention, University of Rome Tor Vergata, Italy	17
12	Braithwaite, Jeffrey	Australian Institute of Health Innovation, Macquarie University, Sydney, NSW, Australia	17
13	Mair, Frances S.	General Practice and Primary Care, Institute of Health and Wellbeing, University of Glasgow, Glasgow, GB, UK	16
14	May, Carl R.	Department of Health Services Research and Policy, Faculty of Public Health and Policy, London School of Hygiene and Tropical Medicine, London, United Kingdom	15
15	Granek, Leeat	School of Health Policy and Management and Department of Psychology, Faculty of Health, York University, Toronto, Ontario, Canada	15
16	Ni, Pengsheng	Department of Health Law, Policy, and Management, School of Public Health, Boston University, Boston, MA	14
17	Gagnon, Marie-Pierre	Faculty of Nursing, Université Laval, Québec, Canada	14
18	Marchal, Bruno	Department of Public Health, Institute of Tropical Medicine, Antwerpen, Belgium	14
19	Goodman, Claire	Centre for Research in Public Health and Community Care, university of Hertfordshire, Hatfield, United Kingdom; NIHR Applied Research Collaboration-East of England (ARC-EoE), Cambridge, United Kingdom	14
20	Williams, Geoffrey C.	Department of Clinical and Social Sciences in Psychology, University of Rochester, Rochester, NY, USA	13

nursing practice. In the 21st century, many countries have become aging societies, and nursing theory has also often been applied in the care of older people and chronic diseases to improve patients' quality of life. Theoretical research is inseparable from the development of nursing education. Further improvements in theory will require more research based on clinical practice.

From 1990 to 2000, there were 10 research hotspots related to nursing theory, including psychology, ethics, family care, care outcomes, quality of life, primary health care, adolescents, nursing research, theoretical models, and cancer chronic diseases. From 2001 to 2012, nursing theory research formed

fifteen research hotspots, including health promotion, nurse decision-making, evidence-based practice, methodology, long-term care, parental care, women's health, home care, hospice care, the elderly, sexually transmitted diseases, qualitative research, assessment, nursing practice, and philosophy. From 2013 to 2022, eight research hotspots related to nursing theory have been formed, including patient-centered, grounded theory, psychological ethics, nursing education, nursing intervention, nursing theory, quality of life, and aging. In terms of the research object, theoretical research has evolved from children and adolescents at the beginning to women's health and has recently moved its focus to application among older

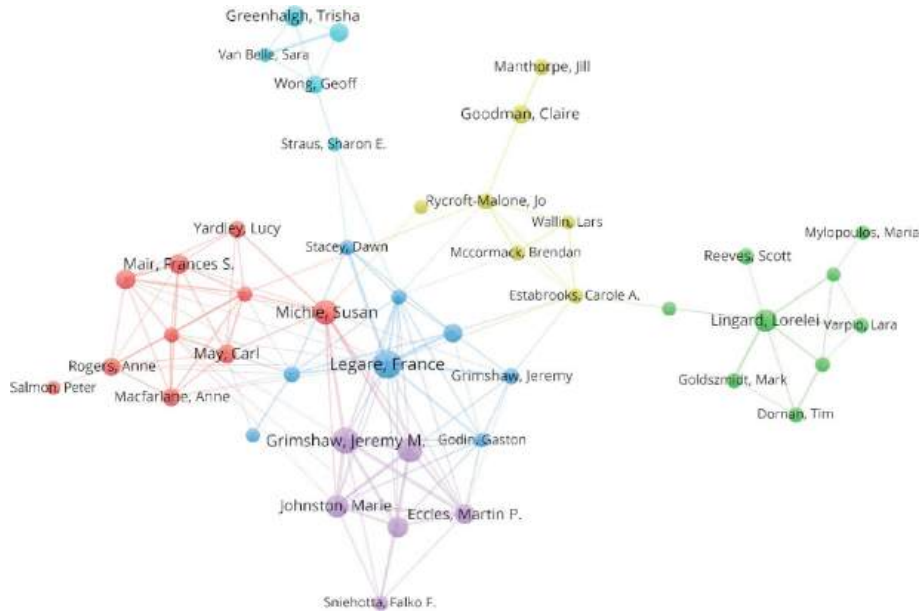


FIGURE 3: Collaboration network of highly productive authors of publications on nursing theory in WoS from 1990 to 2022.

TABLE 7: Top 10 funding agencies from which publications on nursing theory in WoS from 1990 to 2022 received funding.

No	Funding	Publications
1	United States Department of Health Human Services	1935
2	National Institutes of Health (NIH)	1526
3	Canadian Institutes of Health Research (CIHR)	327
4	National Natural Science Foundation of China	276
5	National Institute for Health Research (NIHR)	235
6	National Institute of Mental Health	214
7	Economic Social Research Council (ESRC)	209
8	Agency for Healthcare Research Quality	207
9	National Science Foundation (NSF)	203
10	European Commission	201

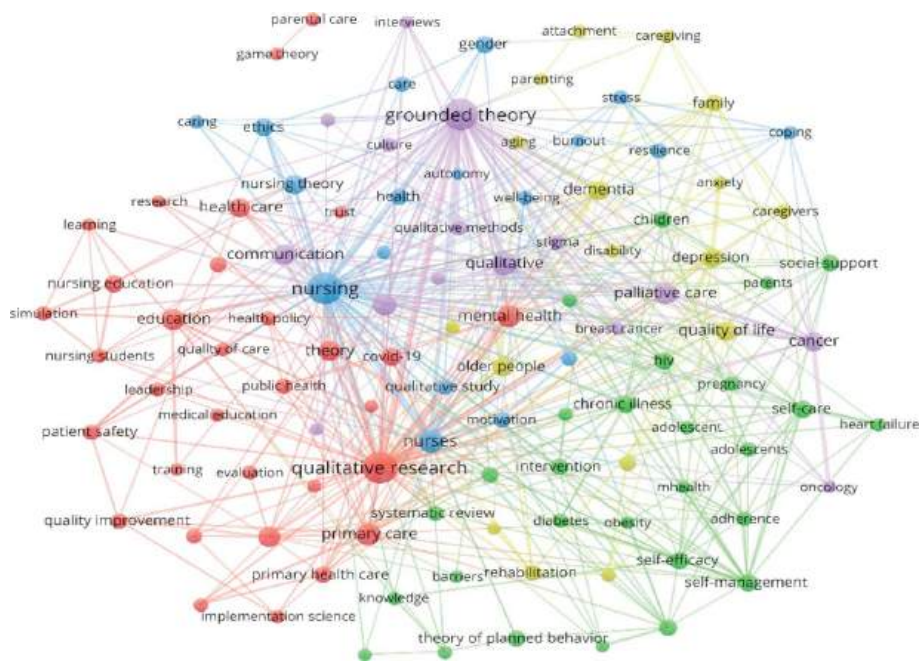


FIGURE 4: Co-occurrence network of high-frequency keywords in nursing theory publications in WoS from 1990 to 2022.

TABLE 9: List of research hotspots in the clustering of high-frequency keywords in nursing theory publications in WoS from 1990 to 2000.

Clustering	Research hotspot	Keywords
1	Psychology	Mental health, social support, decision making, depression, compliance, motivation
2	Ethics	Ethics, sexual selection, AIDS, justice
3	Family nursing	Communication, family, coping, self-care, women, knowledge
4	Nursing outcome	Nursing, quality of care, patient satisfaction, education, nursing knowledge, outcomes, reflection, nursing practice, managed care
5	Quality of life	Hope, participation, quality of life, physicians, doctor-patient relationship, empowerment, nurses
6	Primary healthcare	Culture, health policy, health care, primary health care, economic evaluation, health, health promotion, primary care, policy
7	Children and adolescents	Learning, adolescents, children, pregnancy, parental care
8	Nursing research	Phenomenology, grounded theory, methodology, nursing research, evaluation, qualitative research, epistemology, concept analysis, philosophy, research
9	Theoretical model	Theory-practice gap, nursing theory, models, parse theory, human becoming theory, theory of planned behavior, systems theory
10	Cancer chronic diseases	Chronic illness, cancer, dementia

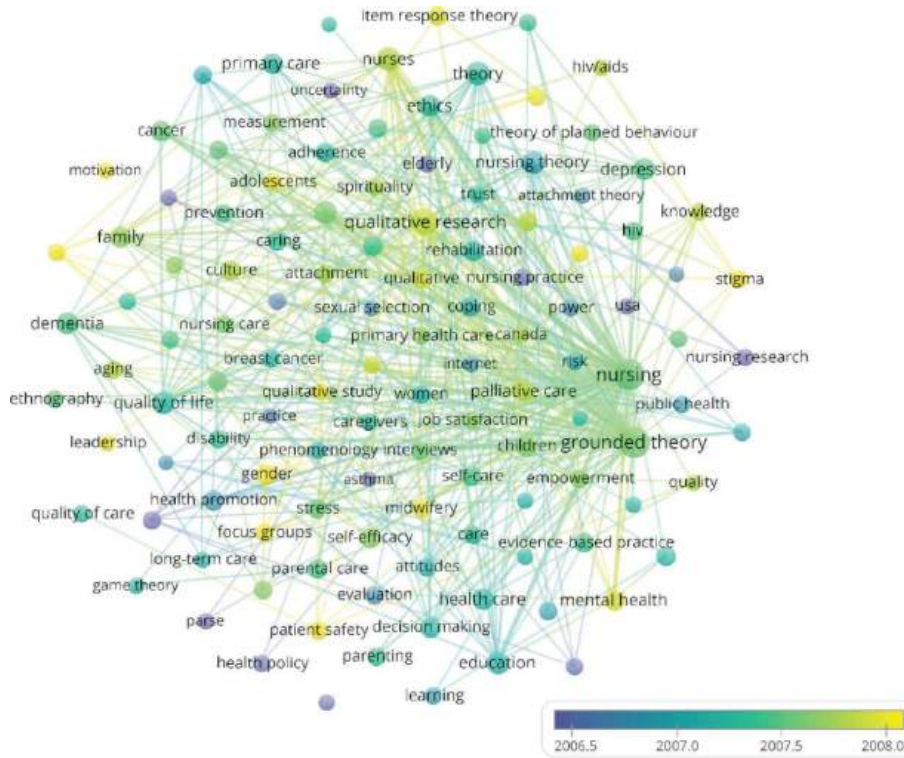


FIGURE 6: Co-occurrence network of high-frequency keywords in nursing theory publications in WoS from 2001 to 2011.

TABLE 11: List of research hotspots in the clustering of high-frequency keywords in nursing theory publications in WoS from 2012 to 2022.

Clustering	Research hotspot	Keywords
1	Patient-centered	Knowledge translation, patient safety, chronic illness, primary care, patient-centered care, technology, public health, healthcare, implementation, hospital, ethnography, leadership, integrated care, evaluation, social support, primary care, evidence-based practice, risk, health policy, older people, quality improvement, process evaluation
2	Grounded theory	Communication, cancer, qualitative research, family, grounded theory, qualitative, coping, palliative care, family, adolescents, children, attachment, decision-making, qualitative methods, decision-making, interviews, identity, resilience
3	Psychological ethics	HIV/AIDS, COVID-19, stigma, stress, pregnancy, mental health, India, gender, mental health, women, barriers, South Africa, Canada, health disparities
4	Nursing education	Nursing education, education, nursing, nurse, well-being, medical education, nursing students, medical education, Australia, simulation, China, assessment, job satisfaction
5	Nursing intervention	Adherence, exercise, knowledge, health, health promotion, attitudes, motivation, behavior change, self-efficacy, prevention, self-care, self-management, Internet, intervention, physical activity, heart failure, diabetes, intervention, prevention, obesity
6	Nursing theory	Ethics, nursing practice, concept analysis, theory of planned behavior, self-determination theory, game theory, health, spirituality, culture, nursing theory, item response theory, theory, research, phenomenology, item response theory, autonomy
7	Quality of life	Breast cancer, quality of life, rehabilitation, older adults, dementia, disability, depression, quality of care, stroke, long-term care, psychometrics, anxiety
8	Aging	Parenting, parental care, decision-making, aging, parents, recovery

5. Conclusions

In summary, bibliometric methods and VOSviewer software were used in this study to analyze the literature in English on nursing theory included in the WoS database during the 33 years between 1990 and 2022. Historical changes in nursing theory were explored based on the annual number of publications, and the authoritative academic journals of nursing theory were identified based on the number of articles published. Moreover, the leaders of the theoretical discipline and their academic research teams were identified according to the authors and institutions. Moreover, the research hotspots and developmental trends of nursing theory were explored based on keyword clustering and topic evolution analysis. Nursing theory research has been increasingly applied to clinical practice and tested or verified through disease intervention. The theoretical research is inseparable from the development of nursing education. The methodologies of theoretical studies should be specific and diversified. Further improvement in nursing theory requires patient-centered clinical practice [10]. Therefore, according to the suggestions and guidance of nursing theory and nursing practice in this study, the advancement of this study will be very conducive to improving and enhancing nursing management and thus has vital guiding significance for the nursing discipline.

Data Availability

The data used can be found in the references listed.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Review Article

Trust in the Leader and Trust in the Organization in Healthcare: A Concept Analysis Based on a Systematic Review

Venla Karikumpu ¹, Arja Häggman-Laitila ^{1,2}, Johanna Romppanen ¹,
Mari Kangasniemi ³ and Anja Terkamo-Moisio ¹

¹Department of Nursing Science, University of Eastern Finland, Kuopio Campus, P.O. Box 1627, Kuopio FI-70211, Finland

²City of Helsinki Social Services, Health Care and Rescue Services Division, P.O. Box 6000, Helsinki FI-00099, Finland

³Department of Nursing Science, University of Turku, Medisiina B, Turku FI-20014, Finland

Correspondence should be addressed to Venla Karikumpu; venlaka@uef.fi

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Orientation. Trust is the central part of leadership and organizational culture and can often go unnoticed until it decreases. There is a lack of a comprehensive concept analysis of trust in the healthcare setting. *Research Purpose.* The research aim was to gather, assess, and synthesize previous empirical evidence from the field of healthcare about the concepts of trust in the leader and trust in the organization. *Motivation for the Study.* To create a comprehensive and generic concept analysis of trust in the leader and organization for the healthcare sector based on recent empirical studies. *Research Design and Method.* A concept analysis, which followed the method presented by Walker and Avant, was conducted as a systematic review that adhered to the PRISMA guidelines. A total of eight databases were searched for relevant literature and 42 articles were included. *Main Findings.* The definitions of trust in the leader and the organization were based on emotion and cognition. Trust in the leader emerged as a core feature of collaborative leader-employee relationships, whereas trust in the organization was a key construct of organizational functioning. Trust in the leader and the organization contributed to commitment, increased work production, enhanced collaboration, and improved workplace well-being. Defense mechanisms were identified as a new contrary concept, while justice was found to be a related concept. *Contribution.* Both trust in the leader and trust in the organization positively impact an organization, nurse leaders, and employees. Deeper knowledge of trust and its attributes will be critical to the operationalization and estimation of levels of trust in healthcare organizations. *Managerial Implications.* Trust in the leader and the organization can significantly influence the attractiveness of an organization, retention of personnel, productivity, and work-related well-being. Thus, this aspect should be measured and developed systematically while acknowledging the antecedents of trust building.

1. Introduction

Healthcare organizations constantly face strategic and operational changes due to various challenges, e.g., workforce shortages, inequalities in service coverage, and policy discrepancies [1]. At the same time, the general population is characterized by health inequalities, unmet health care needs, and demographic ageing [1, 2], factors which have considerably increased the amount of people with multiple health problems [3]. Responding adequately to these challenges requires healthcare reforms that involve innovative solutions

concerning the provision of patient-centered, high-quality care [2]. A crucial part of this is ensuring that all individuals, regardless of social challenges or characteristics such as financial situation, place of residence, age or multimorbidity, have equal access to healthcare [2, 4].

Leaders in organizations are tasked with maintaining service continuity in various situations and supporting the workforce through changes in service provision [5]. As such, a comprehensive assessment of leadership competencies is a prerequisite for healthcare reforms [6]. Strong leadership competencies translate into decreased change resistance,

which is inevitable during the implementation of reforms [7]. In addition to change leadership [8], along with visionary and encouraging leadership [9], leaders need to be well versed at developing and maintaining strong collaborative relationships with different stakeholders [6, 10, 11]. All of these aspects highlight the significance of trust in both the leadership and organization [12]. Trust is such an apparent part of leadership and the organizational culture that it often goes unnoticed until it decreases [13]. Thus, leadership should be periodically assessed, as well as measured prior to any large organizational changes as it has various positive effects [9, 13]; notably, increased cost-effectiveness [14], improved ethical competence [15], and work engagement among employees [16], along with enhanced overall quality of patient care [17].

The concept of trust is a topic of interest in several scientific disciplines, e.g., psychology, sociology, nursing, medicine [18], religion, philosophy, and business [19]. As such, it is unsurprising that trust is approached through several definitions and dimensions depending on the field of science [17, 19]. We identified three previous articles [17, 19, 20] that describe trust in the context of nursing. The oldest article, published in 2011, is a literature review that includes 20 studies published between the years 2002 and 2008 and limited to critical care. The results revealed that most of the published studies focused on trust within the nurse-patient relationship, with none of the articles describing relationships among healthcare staff [17]. Another article, published in 2014, presented the results of a concept analysis. The study material included interviews with 28 nurses and 11 nurse managers working in acute and community care. However, the analysis focused solely on the antecedents, attributes, and consequences of trust, while various definitions and related concepts were not considered [20]. Most recently, trust was approached by using concepts from other disciplines, e.g., arts or business, by employing Watson's theoretical perspective. The provided examples centered around the nurse-patient relationship as a helping-trusting relation, while the relationships between leaders and nurses were not assessed [19]. Thus, there is a limited amount of studies on trust from the healthcare setting. Furthermore, the studies that do exist are based on historical data and do not provide a comprehensive view of the concept of trust for the healthcare sector. This highlights the need for a comprehensive concept analysis on the issue of trust within healthcare. Furthermore, the nurse-patient relationship starkly differs from the nurse-nurse leader relationship, as well as the relationship between a nurse and the organization, due to imbalances in hierarchical power. Trust can be regarded as a dynamic social construct that changes over time [19]; this further proves that the empirical literature on trust in the healthcare sector needs to be updated. The present article fills this research gap by presenting a concept analysis of trust that is based on the systematic review of empirical data and performed according to the method introduced by Walker and Avant [21]. The present review identified empirical studies that described trust in leaders and/or healthcare organizations

with the underlying goal of developing an instrument for future studies. Even when leadership and the organization are closely intertwined, essential differences exist between them; thus, the contents and features of these two concepts have been differentiated.

The aim of this study was to gather, assess, and synthesize previous empirical evidence from the field of healthcare about the contents and characteristics surrounding the concepts of trust in the leader and trust in the organization. The research was performed under the guidance of the following questions:

- (1) How are the concepts of trust in the leader and trust in the organization described and defined and what kind of attributes have been associated with these concepts in empirical research?
- (2) Which antecedents and consequences of trust in the leader and trust in the organization have previously been identified?
- (3) What kinds of borderline, related, and contrary cases of trust in the leader and trust in the organization have been identified?

2. Materials and Methods

2.1. Design. A concept analysis based on a systematic review was conducted according to the PRISMA checklist [22] (Supplementary table 1) and the method presented by Walker and Avant [21].

2.2. Search Methods. A systematic literature search was conducted in March 2021 and updated in January 2024; the search was performed across the following eight databases: Medic; PsycINFO; MEDLINE (Ovid); SocIndex; PubMed; CINAHL; Web of Science; and Scopus. The search strategy was created in collaboration with an information specialist. The search terms (Table 1) covered trust-related terms in both Finnish and English that were combined by using Boolean operators. The inclusion and exclusion criteria are presented in Table 1, and the searches were limited to peer-reviewed articles published between March 2010 and December 2023 in Finnish or English.

The search yielded a total of 9,201 titles that were moved to RefWorks, after which the results of the updated search were transferred into Covidence. Following duplicate removal ($n = 2,308$), a total of 6,893 titles were independently screened by two researchers (VK and JR). Next, the abstracts ($n = 383$) of relevant articles were independently screened by two researchers (VK and JR), after which the results were compared. Consensus was achieved by discussion, and a third researcher (AT-M) was consulted when a consensus could not be reached. A total of 145 full-text articles were assessed for eligibility. The final data include 44 original articles (Figure 1). The results of the selection process were discussed with two other researchers (AT-M and AH-L), who provided an additional assessment of the relevance of chosen articles [23].

TABLE 1: Search strategy.

Databases	Search terms	Inclusion criteria	Exclusion criteria
Medic PubMed Scopus Web of Science CINAHL PsycINFO SocINDEX MEDLINE (Ovid)	luottamu* AND terveydenhuol* trust* AND "healthcare" AND (leadership OR management) AND NOT (patient* OR client*)	(i) Trust in the leader or in the organization (ii) Context of healthcare (iii) Empirical study designs	(i) Trust not defined (ii) No empirical evidence of trust (iii) Trust outside the leader or the organization (iv) Other context than healthcare (v) Reviews or meta-analyses (vi) Low quality of articles

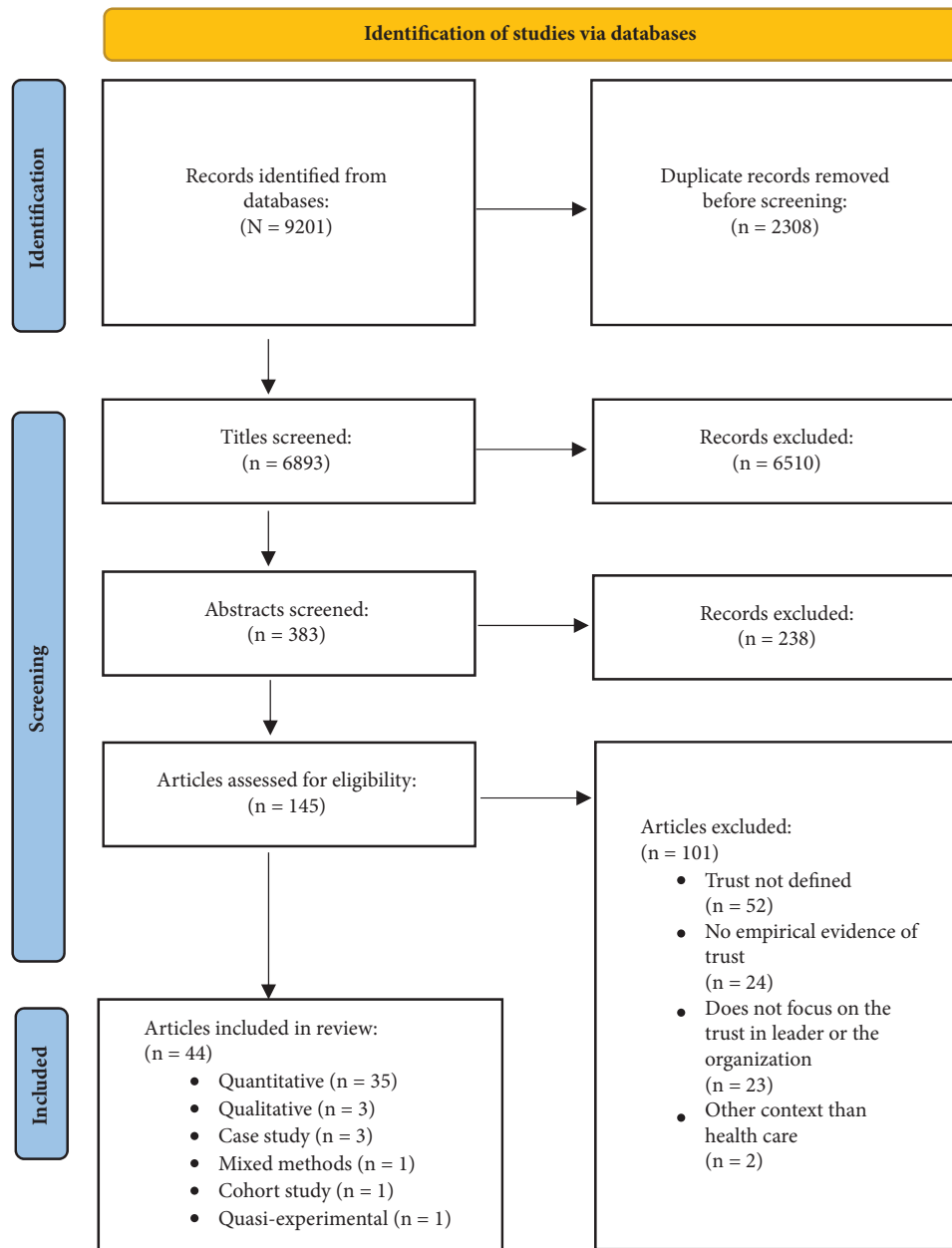


FIGURE 1: PRISMA flowchart of search results [22].

2.3. Quality Appraisal. The quality of all of the included studies was independently evaluated by two researchers (VK and JR) according to a checklist from the Center for Evidence-Based Management [24] (Supplementary table 2). The cutoff point for acceptance was set at 50% of the possible points [25].

A cross-sectional checklist (12 items) was used to appraise the quality of quantitative studies. The strengths of these studies included a clear research frame, solid methods, application of reliable instruments, and a clear presentation of the results. However, confounding factors were sparsely presented, which was assessed as a weakness. Articles which reported case studies, along with one mixed methods study, were assessed by the case study checklist (10 items). The

strengths of these studies were clear descriptions of settings, data collection, and credible outcomes, whereas unclear descriptions of the researchers' roles and analytical methods emerged as weaknesses. The qualitative checklist (10 items) was employed to appraise the quality of interview studies. The strengths of these studies included clear descriptions of study design, context, fieldwork, and outcomes. The most common weakness of the included qualitative studies was insufficient description of researchers' contributions and roles. The quality of the quasiexperimental study included in this review was appraised using the checklist of a controlled study (12 items); the checklist of a cohort or panel study (12 items) was employed to assess the quality of the one identified cohort study. The strengths of these studies

included strong methods and sufficient sample size as was the case in quantitative studies, and missing descriptions of confounding factors were assessed as the primary weakness.

Following the independent assessment of article quality, the two researchers (VK and JR) discussed their findings and consulted a third researcher (AT-M) in the case of any disputes. As a result of the quality assessment, two articles [26, 27] were excluded from the review due to a low level (<50%) of accrued points [25]. Thus, the review included a total of 42 articles.

2.4. Data Extraction, Concept Analysis, and Degree of Evidence. A matrix for the data extraction was developed for the purpose of this study. It included information about study design, aim, context, data collection, analytical method, and results concerning the concepts of trust. In the first phase of the analysis, the data were repeatedly assessed to identify any descriptions of trust in the leader and trust in the organization; this approach was in line with the concept analysis method presented by Walker and Avant [21]. The original expressions related to the research questions were condensed and then moved into the results section of the matrix. Next, condensed expressions of the definitions of trust in the leader and trust in the organization were compared according to their similarities and differences and then divided into three groups based on content. The condensed expressions concerning the attributes (Table 2) and antecedents (Table 3), along with borderline, related, and contrary cases as well as consequences (Table 4), of trust were then categorized into the following two groups: trust in the leader and trust in the organization. In the next step, the expressions were compared according to similarities and differences to identify sub, upper, and main groups. The identified groups were named according to their contents [69]. Lastly, the degree of evidence was evaluated to identify the essential main outcomes [70]. The strongest degree of evidence was indicated with A, consisting of meta-analyses, systematic reviews, and randomized control trials (RCTs). Degree B included cross-sectional studies, whereas C indicated studies with qualitative study design. The lowest degree of evidence was indicated with D, including observational designs. In addition, the study limitations, quality of results, and directness of evidence across different studies influenced the conclusion of the degree of evidence [70].

3. Results

3.1. Study Characteristics. The data consisted of quantitative surveys ($n=33$), qualitative interview studies ($n=3$), and case studies ($n=3$). In addition, one mixed methods study, one cohort study, and one quasiexperimental study were included in the data (Figure 1). All of the included articles were published between 2010 and 2023, with most ($n=32$) published after the year 2015. The studies were conducted in Turkey ($n=9$), the USA ($n=7$), Australia ($n=3$), South Africa ($n=3$), Canada ($n=3$), Finland ($n=2$), Norway ($n=2$), Pakistan ($n=2$), Spain ($n=2$), Sweden ($n=2$), Denmark ($n=1$), Iran ($n=1$), Israel ($n=1$), Korea ($n=1$),

and Nigeria ($n=1$). Moreover, two articles reported the results of a study that had been conducted in two countries, USA and England, as well as Finland and Norway (Supplementary table 3).

Of the identified studies, 24 focused on trust in the leader and 18 concerned on trust in the organization. The studies were mainly conducted in the context of public healthcare ($n=23$), while one study covered the private healthcare sector; three studies reported results concerning both the public and private healthcare sectors. It should be noted that 14 studies mentioned the healthcare context but did not clearly define it. In one of the included studies [62], the healthcare employees represented only 10% of the participants. A total of 29 articles reported employees' perspectives of trust, whereas four studies covered the leaders' perspective; both the perspectives of employees and leaders were described in nine articles (Supplementary table 3). Finally, the reference lists of the included studies were searched to determine the contents of the provided definitions. As a result, the definitions in the next section are based on original articles that were published outside of the time range included in the present review. The connection to the current data is presented in Supplementary table 4.

3.2. Definitions of Trust in the Leader. Trust in the leader was defined in 11 different ways, which could be divided into emotion-based and cognition-based trust. The emotion-based definitions described trust as the trustor's willingness to be vulnerable in a situation where they are performing an action which is important to them [71, 72]. In such situations, the leader or employee ventures into a position of interdependence [73], i.e., the trustor takes a risk of trusting the trustee without the ability to control their actions [71, 74, 75]. The emotion-based definitions of trust included reciprocal positive expectations of benevolence [71, 72, 74–77] in accordance with open interaction [73, 78]. The cognition-based definitions of trust were related to belief in the competence of the trustee [78, 79].

3.3. Definitions of Trust in the Organization. Trust in the organization was defined in 12 different ways, which could be divided into emotion based, cognition based, and predictability of the organization's functions. The emotion-based definitions included a trustor's willingness to be vulnerable when a group or organization performs an action that was important to the trustor [80–82]. Therefore, these definitions included trustees' positive feelings about organizational support and confidentiality [71, 83, 84]. The cognition-based definitions described the reciprocal expectation of competence and reliability [71] to promote mutual interests even in situations where the trustee could act based on self-interest [84, 85]. Trust in the predictability of the organization's functions was described as the integrity [86–88] and ethicality [89] of an organization's functions. In addition, trust was described as the trans-sectional presence of reciprocal trust across different organizational levels [81, 90].

TABLE 2: Attributes of trust in the leader and trust in the organization with references and level of evidence.

Attributes	Trust in the leader	Trust in the organization
The core collaborative leader-employee relationship	[28–34] Level of evidence: B	[35–43] Level of evidence: C
A key construct of organizational functions	[29, 30, 33, 34, 44–49] Level of evidence: B	[40, 41, 43, 50–52] Level of evidence: C
Positive expectations of benevolence	[29, 44, 48, 49, 53, 54] Level of evidence: B	[40, 43, 52, 55] Level of evidence: C
Social interaction	[34, 44, 45, 49] Level of evidence: B	
A leader's competence	[30, 33, 34, 45, 48, 56, 57] Level of evidence: B	
Risk and vulnerability		

TABLE 3: Antecedents of trust in the leader and trust in the organization with references and level of evidence.

Antecedents	Trust in the leader	Trust in the organization
Leadership skills	[30, 32, 44, 47, 49, 58, 59] Level of evidence: B	[36–38, 50, 55] Level of evidence: C
Consistent action	[28, 34, 44, 45, 48, 54, 59, 60] Level of evidence: B	
The role of employees		[37, 40, 52, 61] Level of evidence: C
Open interaction	[34, 44, 56, 60] Level of evidence: B	
Collaboration	[32, 34, 44, 48, 62] Level of evidence: B	

3.4. Attributes of Trust in the Leader. The attributes of trust in the leader could be described as the core collaborative leader-employee relationship, positive expectations of benevolence, social interaction, a leader's competence, and risk and vulnerability (Table 2). Descriptions of the core collaborative leader-employee relationship stated that trust is a critical foundation of all actions. Thus, it is recognized as a sensitive, reciprocal process that requires time to develop. Furthermore, it is considered a fragile construct that can be easily broken. The attribute of positive expectations of benevolence was described as the trustor's convictions about the trustee's motives, intentions, and actions. In other words, benevolence means that a trustee's ethical and moral actions are not based on self-interest. Moreover, a trustee's strategic actions are expected to lead to reciprocal benefits (Table 2).

According to the included articles, social interaction is realized as reciprocal and positive communication between the trustor and the trustee, whereas a leader's competence was described as the ability to lead, create a sense of security, and inspire employees through an expert role. As such, a leader's competence enables employees to demonstrate their professionalism and focus on their duties. The attribute of risk is based on the trustor's expectations that the trustee's actions or intentions cannot be controlled. Furthermore, trust creates a situation in which both parties (trustor and trustee) are willing to be exposed to reciprocal vulnerability (Table 2).

3.5. Attributes of Trust in the Organization. The identified articles included the following attributes of trust in the organization: a key construct of organizational functions; positive expectations of benevolence; and social interaction (Table 2). Trust, as a key construct of organizational functions, is an important tool in leading collaborative relationships and developing professionalism. It is also crucial for success across various organizational levels. The attribute of positive expectations of benevolence is related to situations in which employees trust that the organization will take care of employee well-being and problems. The attribute of positive expectations of benevolence describes how an employee functions within an organization, which includes interactions with the leader. Social interaction also included a leader's willingness to act honestly and predictably (Table 2).

3.6. Antecedents of Trust in the Leader. The antecedents of trust in a leader were leadership skills, consistent action, open interaction, and collaboration (Table 3). The leadership

style, which falls under leadership skills, favors collaborative relationships that advance trust, i.e., transformational, ethical, and authentic leadership. Trust could also be promoted by the appropriate use of different forms of power, namely, reward, legitimate, and referent power. Therefore, leadership skills were described through the readiness to modify leadership practices, for example, through actively informing and involving employees (Table 3).

Consistent action included a leader's benevolence, which includes the ability to identify employees' feelings. This attribute was described through a leader's ability to acknowledge the diverse and individual perspective of their employees. Furthermore, this attribute included the competent actions of consistent leaders, for example, ability to make decisions and motivate employees. A leader's presence manifests as authenticity, visibility, and integration into the work community, all of which support trust formation. Lastly, a leader's involvement, including employee encouragement, as well as employees' impact on planning processes or decision-making, was identified as antecedents of trust in terms of a leader's consistent action (Table 3).

Open interaction included knowledge sharing and the openness of the work community. Reciprocally, active listening, along with the provision of feedback and experiencing a connection through profound communication, were important to building trust and could be strengthened by a leader's positive attitude. In addition, collaboration consisted of commitment by both the leaders and employees, as well as reciprocal collectivity. Trust is built when there is responsibility in collaboration, i.e., each member of the team takes care of their own duties. Collaboration also includes employees' positive feelings about organizational actions, or—in other words—their ability to thrive at work (Table 3).

3.7. Antecedents of Trust in the Organization. According to the identified articles, the antecedents of trust in the organization are leadership skills and the role of employees (Table 3). Leadership skills, when considered in the context of the organization, include approaches such as authentic and transformational leadership. This can be extended to certain positive characteristics of an organization, such as stability, competence, honesty, and loyalty. The role of employees consists of employees' openness in sharing tacit knowledge. Therefore, this aspect was described through concepts such as work engagement, job satisfaction, and obsession with work performance. Moreover, this aspect includes employees receiving fair treatment and being committed to the organization both affectively and normatively (Table 3).

TABLE 4: Consequences of trust in the leader and trust in the organization with references and level of evidence.

Consequences	Trust in the leader	Trust in the organization
Commitment	[39, 40, 43, 44, 53, 54, 59] Level of evidence: B	[37, 40–43, 50, 63] Level of evidence: C
Increased productivity at work	[29, 30, 32, 44, 46, 48, 56, 58, 62, 64, 65] Level of evidence: B	[35, 36, 38, 42, 55, 66] Level of evidence: C
Increased collaboration	[44, 49, 57, 64, 67, 68] Level of evidence: B	[35, 42, 51, 61] Level of evidence: B
Increased workplace well-being	[29, 39, 44, 47, 65] Level of evidence: B	[41, 42] Level of evidence: C

3.8. Consequences of Trust in the Leader and Trust in the Organization. The consequences of trust in the leader and the organization consisted of commitment, increased productivity at work, increased collaboration, and increased workplace well-being (Table 4). When considered from the lens of trust in the leader, commitment to work was described as the commitment of the work community to the constant development of activities. As commitment is a reciprocal process, it can be categorized as affective, normative, and continuance organizational commitment. When shifting to trust in the organization, commitment was categorized into work and the organization. Additional definitions of organizational commitment stated that trust increases both continuance and affective commitment (Table 4).

When considering trust in the leader, increased productivity at work included better motivation and creativity to work, both of which increase innovativeness. For instance, work performance improved when a team or an individual successfully accomplished their work duties. In addition, trust in the leader increased leaders' and employees' experiences of efficiency. Furthermore, trust improved employee attitudes, which decreased cynicism towards changes. From the lens of trust in the organization, increased productivity at work included experiences of high-quality care and a concern for safe behavior. Furthermore, trust was found to increase the performance of a team, as well as organizational efficiency, productivity, and the conscientiousness of employees (Table 4).

In terms of trust in the leader, increased collaboration consisted of common goal orientation and shared decision-making. For instance, polite interactions between team members increased as employees felt encouraged to communicate with the leader, even about sensitive and/or confidential issues. Concerning trust in the organization, increased collaboration comprised good communication, cohesion, and an employee's ability to identify with the leader's values; the published research suggested that this makes clinical decision-making easier. Furthermore, this aspect of trust was described as an ethical atmosphere in which employees target common goals, are polite, and demonstrate selflessness (Table 4).

When considering trust in the leader, increased workplace well-being manifested as improved work satisfaction, especially among employees. Trust in the leader facilitates improvements in satisfaction with change processes and the organization. Furthermore, this aspect describes mental and physical health, which translates to safe overall behavior. From the lens of trust in the organization, increased workplace well-being improved job satisfaction among employees. Moreover, this trust enables employees to better manage their stress and perform high-quality work (Table 4).

3.9. Overview of the Main Results of the Concept Analysis. The antecedents, attributes, and consequences of trust in the leader and trust in the organization are presented in Figure 2, with the level of evidence specified for each finding.

The findings for trust in the organization showed lower levels of evidence when compared to findings for trust in the leader.

3.10. Borderline, Related, and Contrary Concepts of Trust in the Leader and Trust in the Organization. The borderline, related, and contrary concepts of trust in the leader and the organization included the same concepts, with the exception of defense mechanisms, which were a part of the contrary concept of trust in the leader. The psychological contract emerged as a borderline concept of trust because both concepts contained several joint attributes. At the same time, it was also seen as an antecedent of trust, as the psychological contract is based on reciprocal expectations of actions and keeping the promises of the trustee [44, 66]. Justice was identified to be a related concept of trust [52] as it is also part of the core of a healthy organization [59]. Furthermore, the concept of justice is embedded in the interactions that produce social welfare, as is trust [62]. Thus, interactional and distributive justice depends on the quality of the collaborative relationship when integrated into trust in the leader [60].

Distrust was recognized as a contrary concept to trust [34], with a lack of open communication and employees' perceptions of injustice exerting a negative influence on trust [31, 91]. Employees' experiences of betrayed promises, the inability to get involved in decision-making, and the lack of a leader's support enhance distrust [91]. Furthermore, defense mechanisms [46] emerged as a contrary concept of trust and described as the actions or thoughts that protect individuals, groups, or organizations when confronting unpleasant realities [48]. These unpleasant realities were described through decreased trust—mainly due to insufficient collaboration—and a lack of communication, both of which lead to situations in which the trustor is not willing to be vulnerable towards the trustee [48].

3.11. Model Case of Trust in the Leader and Trust in the Organization. A healthcare organization has recruited a nurse who will work in the ward. Another colleague introduces this nurse to the work. The colleague says, "Welcome to our ward and to our hospital. Here, we have warm, collaborative relationships with colleagues and especially with our leader (attributes: a key construct of organizational functions and a core of collaborative leader-employee relationship). I have learned to trust her because she always stands up for us and treats us fairly (attribute: positive expectations of benevolence). It is easy to talk to her, even about difficult things and feelings. She listens, seriously considers the issues we talk about, but also asks for our opinion (attribute: reciprocal social interaction). Our leader has a Master's degree (attribute: competence), but she is always willing to improve as a leader. She constantly asks us for feedback and wants to know what aspects she should develop further (attribute: vulnerability). Because of this, our

Trust in the leader			Trust in the organization		
Antecedents: Leadership skills (B) Consistent action (B) Open interaction (B) Collaboration (B)	Attributes: The core collaborative leader-employee relationship (B) Positive expectations of benevolence (B) Social interaction (B) A leader's competence (B) Risk and vulnerability (B)	Consequences: Commitment (B) Increased productivity at work (B) Increased collaboration (B) Increased workplace well-being (B)	Antecedents: Leadership skills (C) The role of employees (C)	Attributes: A key construct of organizational functions (C) Positive expectations of benevolence (C) Social interaction (C)	Consequences: Commitment (C) Increased productivity at work (C) Increased collaboration (B) Increased workplace well-being (C)

FIGURE 2: Antecedents, attributes, and consequences of trust in the leader and trust in the organization.

leader enables us to face our deficits, grow in our profession, and in that sense accept the risk of trusting each other (attribute: risk).”

The nurse continued, “This all is possible because the hospital invests in every level of the organization including employee well-being and keeps promises concerning professional development and employee involvement in decision-making (attribute: positive expectations of benevolence). The hospital strategy includes the following key values of leadership: open, honest, and predictable interactions (attribute: social interaction). Therefore, it is easy to expect that your leader will also behave in this way (antecedents: consistent action and open interaction). The hospital constantly educates leaders (antecedent: leadership skills) and develops forums for employee involvement (antecedents: the role of employees and collaboration).”

The nurse concluded, “Nurse turnover in the hospital and in our ward is the lowest in this city area (consequence: commitment). Our peers are innovative and work together efficiently (consequences: increased productivity at work and increased collaboration), and everyone demonstrates a positive attitude towards change without resistance (contrary concept: defense mechanisms). We do not have many absences from work (consequence: increased workplace well-being) and our hospital has been judged to be a fair workplace (related concept: justice). I appreciate this hospital a lot, as I have negative experiences with trust from previous workplaces. For example, one of my previous leaders had favorite employees and shared information with them that was withheld from the rest of us (contrary concept: distrust). We hope that you also share these values and can commit to the hospital (borderline concept: psychological contract).”

4. Discussion

To the best of our knowledge, this research represents the first concept analysis that is based on a systematic review of empirical studies and describes the concepts of trust in the leader and trust in the organization in the healthcare context.

Previous literature is characterized by limited descriptions of the concept of trust, most of which focus on either the nurse-patient relationship or a special context within healthcare; furthermore, other descriptions of trust are based on a single interview study [17, 19, 20]. The present study provides a comprehensive analysis of the concept that can be applied to the context of public healthcare. This concept analysis enhances the prevailing nursing literature by describing the definitions and characteristics of trust based on a systematic review of international literature. Furthermore, the topicality of the data in this study (published between 2010 and 2023) provides important insight into the current state and dynamic nature of trust between the leader, employee, and organization. Recent developments within healthcare, such as remote leadership, have caused trust to become recognized as one of the core factors of successful collaborative relationships [92].

The presented descriptions of trust in the leader emphasize the leader's role, whereas the identified components of trust in the organization mostly focus on the functioning of an organization. Trust in the leader was found to include more interactional elements, e.g., risk and vulnerability, than trust in the organization. Moreover, open interactions and collaboration were identified as antecedents of trust in the leader; this was not the case for trust in the organization. The similarities between the identified consequences of trust in the leader and trust in the organization mean that future research should focus on this content. Emotion- and cognition-based definitions were used to describe both trust in the leader and trust in the organization. Trust in the leader was found to be at the core of the leader-employee collaborative relationship and included positive expectations of benevolence, social interaction, the leader's competence, as well as risk and vulnerability. Trust in the organization was identified as a key construct of organizational functioning and also included positive expectations of benevolence and social interaction.

Based on the literature assessed in this review, trust in the organization has only received a limited amount of research attention, with most of the presented findings usually

characterized by weak evidence. Also, the borderline, related, and contrary concepts of trust in the leader and trust in the organization have only been covered in a handful of studies. The results concerning trust in the leader demonstrated the strongest overall level of evidence. The content analysis revealed that the definitions of trust could be divided into emotion- and cognition-based concepts, along with the predictability of organizational functioning. Nevertheless, this division was not possible for the attributes, antecedents, and consequences of trust in the leader and trust in the organization; thus, the concept of trust must be further examined in empirical healthcare environments. These results would be important to the eventual formulation of an instrument which could divide trust in healthcare organizations into leader- and organization-centric factors. It is important to note that the present review did not address trust in the client and trust in the coworker, which have also been recognized as important aspects in overall trust. Moreover, it has been found that the levels of trust in healthcare organizations, especially emotion-based trust, are rather low [93, 94]. As such, the presented results could be relevant to the development of healthcare as emotion-based trust was found to be firmly linked with the leader.

The presented results, which reflect empirical research, support the theoretical definitions of trust described in different disciplines of science [71, 78, 90]. Trust serves as one of the core pillars of an organization, with collaborative relationships—which include positive expectations of benevolence and interaction—typical of environments with high levels of trust. The presented results agree with what has been reported in previous concept analyses; nevertheless, there are also notable differences between the present review and prior research. For instance, Mullarkey and colleagues [17], along with McCabe and Sambrook [20], highlight the integrity, openness, and competence of a leader when discussing trust. Furthermore, Mullarkey and colleagues [17] emphasize that trust is a central driver of organizational success, expectations of behavior, as well as the presence of risk and dependence. In this study, risk and vulnerability, which involve a leader's competence, were linked with trust in the leader based on the analyzed studies. The results indicate that it is important to focus on these attributes to build trust both in the leader and in the organization.

The finding that leadership skills and the role of employees are antecedents of trust was supported by previous literature [17, 20, 95]. Destructive leadership was not extensively discussed in the included articles. This is logical because the research into this leadership style is sparse [96] and should be considered in further studies. There is some evidence from other disciplines that a leader's destructive behavior, for example, exercising coercion, invisibility, or impoliteness, will decrease trust [95, 97]. The identified antecedents highlight aspects which should hold a central role in organizational reforms that strive to achieve trust. For instance, reducing—and even possibly eliminating—destructive leadership is the key to building trust in the leader.

According to the research included in this review, integrity and workplace well-being are strong and clear consequences of trust in the leader and trust in the organization, a finding which mirrors previous concept analyses of trust [17, 20, 95]. As has been stated previously, trust positively affects individual well-being, the productivity of a team and its leader, as well as the quality of patient care [17, 20]. The finding that commitment is a consequence of trust is also supported by previous concept analyses [17, 95]. These consequences reinforce the importance of developing trust in the leader and in the organization.

4.1. Strengths and Limitations. The present study was influenced by several strengths and limitations. The primary strength of this study was that an extensive amount of data was collected from empirical research conducted in the healthcare context; these data provided broad answers to the research questions. Furthermore, the identified original articles mostly demonstrated sufficient quality, and the potential biases were acknowledged and described. More specifically, the identified original articles applied relevant methodologies and included adequate samples [98].

The level of evidence underlying the results presented in empirical studies included in this review was low due to the lack of randomized controlled trials; this can be regarded as a limitation of this study. Furthermore, determining valid, empirical reference definitions for trust was outside of the scope of this paper because it requires a qualitative approach; as such, this remains a challenge for future research. Nevertheless, the empirical example of a model case was included to strengthen the reliability of the presented results, according to the concept analysis method of Walker and Avant [21]. The fact that only one researcher performed the database searches decreased the trustworthiness of the research. Nevertheless, the other researchers supported the research process by assisting in searching for relevant knowledge and critically reviewing the formed concepts, with progression to the next study phase requiring a consensus. Furthermore, the conscious application of a negative term (not patient and client) in the Boolean operators might have removed some relevant outcomes from the search. Similarly, the decision to avoid gray literature could be considered a limitation [98].

5. Conclusions

The current review illustrates that there is a lack of concept analyses regarding trust in the leader and in the organization for the field of healthcare; there is a clear need for further empirical research into this phenomenon. Furthermore, the dimensions, definitions, attributes, antecedents, consequences, and other concepts of trust presented in this study need further clarification. There is far less data on trust in the organization, while the low level of evidence, determined via a clear methodology, necessitates further research. Furthermore, there is a need for an instrument that includes comprehensive descriptions of both concepts of trust, i.e., trust in the organization and trust in the leader. The

presented research is relevant because deep knowledge of trust and its attributes will be critical to the operationalization and estimation of levels of trust in healthcare organizations. Furthermore, the concept of trust is clarified when justice was identified as a new related concept to trust, while defense mechanisms represented a contrary concept. Hence, the presented findings could be used to develop interventions for building both trust in the leader and trust in the organization. It would be important to apply methodologies that can determine the organizational costs and effectiveness of these types of interventions.

6. Implications to Nursing Management

Trust in the leader and in the organization exerts significant consequences on the attractiveness of a certain organization, retention of personnel, productivity, and work-related well-being. Thus, it should be measured and developed systematically in a way that acknowledges the antecedents of trust building. The results of this concept analysis may be utilized in the development of such an instrument. Building and maintaining trust are strongly associated with open and honest communication and reciprocal interactions; these are aspects to which nurse leaders should focus on in their daily work. Organizations should support leadership practices that place interaction in the center of the concept, as this would be beneficial to both trust development and a psychologically safe organizational culture. More mentoring and education are needed in this regard. Furthermore, educational organizations may take the current results into account by planning and developing their curricula. In addition, the development of interventions that primarily aim to build and maintain trust, for instance, by preventing distrust and defense mechanisms, may be beneficial for healthcare organizations.

Data Availability

The data used to support the findings of this study are from previously reported studies, which have been cited.

Disclosure

The research was performed as part of the employment at the University of Eastern Finland and University of Turku.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Supplementary Materials

Supplementary Materials include tables supplementing the research article. There is further information about the Materials and Methods, providing the PRISMA checklist of

the review process (Supplementary table 1) and the consensus of quality appraisal (Supplementary table 2). In addition, adhering to the Data section, there are summarized details about all reviewed articles (Supplementary table 3) and have tabulated the definitions of trust including in original articles (Supplementary table 4). (*Supplementary Materials*)

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Research Article

Upward Bullying as Experienced by Chinese Nurse Managers: A Qualitative Study

Jia He,¹ Yuhuan Wang ,² Yangjing Wang,³ Xueqin Guo,⁴ Xin Li,⁵ Huan Jin ,³
and Lijuan Xiong ³

¹Department of Otolaryngology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China

²Department of Urology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China

³Department of Nursing, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China

⁴Neurosurgery Intensive Care Unit, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China

⁵Department of Anesthesiology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, China

Correspondence should be addressed to Huan Jin; jinhuanpost@163.com and Lijuan Xiong; xhxlj@hust.edu.cn

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Aim. To understand the current situation of upward bullying in the Chinese nursing field and explore the manifestations, reasons, and outcomes of upward bullying experienced by Chinese nurse managers. **Background.** Workplace bullying, a serious social problem, is characterised by recurring incidents of intimidating, aggressive, and hostile behaviour. Bullying in the nursing profession exhibits all or some of the above traits. The evidence of upward bullying by subordinate nurses against nurses in positions of authority or power is limited in China. **Methods.** This qualitative study was conducted with semistructured, in-depth interviews involving 12 hospital nurse managers in Wuhan, Hubei Province, between June and August 2023. The data were analysed using the Colaizzi seven-step analysis method with Nvivo 12.0 software as a support. **Results.** We grouped our findings into three main categories: manifestations of upward bullying; reasons for upward bullying; and outcomes of upward bullying. **Conclusions.** Nurse managers in China are exposed to upward bullying in many forms and for complex reasons. More emphasis needs to be given to creating a positive work environment for them to facilitate their managerial role. **Implications for Nursing Management.** This study probes the realities of upward bullying against Chinese nurse managers and highlights the need for managers to develop the skills needed to identify, manage, and prevent bullying from subordinates. By contributing to the development of interventions and strategies that address workplace bullying, this study shows promise for enhancing managerial effectiveness and improving the nursing practice environment.

1. Background

Workplace bullying has become a prominent global issue due to its prevalence in numerous work environments and the resulting public outcry. More than 30 years of research in various organisational settings have shown that it is one of the most complex and unpleasant occurrences in the workplace [1]. According to Giorgi et al., workplace bullying

is a negative behavioural situation that individuals accept over time and find difficult to resist [2]. It is characterised by repeated intimidating, aggressive, and hostile behaviour that includes name-calling, harassment, humiliation, cold aggression, and the devaluation of job results [3]. Both harmful and antisocial, workplace bullying is a very serious problem as it can adversely affect the physical and mental health of victims, resulting in feelings of helplessness, anxiety,

depression, sleep disorders, chronic fatigue, and a decline in job perception and creativity [4]. Its effects on organisations include brain drain, a tarnished image, etcetera [5].

Workplace bullying is not only found in businesses and companies but also prevalent within the nursing profession. The research found that 45% of 470 nurse educators in the United States felt they had been the target of workplace bullying in the past 6 months [6], and 53.3% of 240 nurses in China had suffered workplace bullying [7]. All of the traits of workplace bullying have been documented to various extents in the nursing literature, with nurses who experience even some of these traits exhibiting more negative coping styles, lower job satisfaction, lower staff morale, and poorer performance than their nonbullied counterparts, resulting in a potentially reduced quality of care [8–10]. Previous studies on workplace bullying in nursing have tended to focus on vertical abuse, such as toxic leadership behaviours inflicted by superior nurses on subordinates [11, 12], as well as interpersonal conflicts, known as “horizontal/lateral violence,” between nurses of the same rank [13]. However, anyone within a nursing organisation, regardless of their status, can become a victim of bullying. The victim might be a subordinate, a colleague, or a superior [14], although incidents of the latter being targets of workplace bullying are often overlooked. Managers and other high-ranking individuals are usually seen as authorities and decision-makers, and it is difficult to imagine that they can also be victims of bullying, let alone by subordinates. The modest information on bullying of nurses in managerial and executive positions, however, has suggested that subordinate nurses are the perpetrators of such behaviours [15, 16]. This type of bullying by subordinates toward their superiors is called upward bullying.

Upward bullying in the nursing workplace is defined as bullying behaviour by supervised nurses (including clinical nurses, practicing nurses, and nursing students) toward nurses in positions of authority or power (including leaders with managerial responsibilities such as nurse managers, directors of nursing, and nursing faculty) [17]. For the purpose of this study, which focused on upward bullying in the nursing clinical workplace, we considered only frontline nurse managers as the study subjects and excluded nurse educators. According to Mintzberg’s theory of managerial roles [18], nurse managers are responsible for ward administration, quality improvement, service enhancement, and benefit management, and they play multiple roles such as advocate, leader, supervisor, and coordinator. However, nurse managers may struggle to perform optimally in their workplace roles due to upward bullying and find it difficult to manage within nursing organisations. Whether they choose to retreat or confront the bullying head-on [16, 17], there may be no way of preventing upward bullying from taking a toll on the body, the quality of their work, and the economy [19]. A few literature studies mentioned that factors which may contribute to the victimisation of nurse managers are being in a state of insecurity in the organisation or a shift in power dynamics within the work environment [20]. For example, a young nurse manager who has just assumed their position is more likely to be ostracised by subordinate nurses than an experienced nurse manager.

WHO has recognised bullying as a multifaceted and significant public health problem that requires close attention from families, healthcare providers, and policy-makers [21]. Unfortunately, in China, there have been no reports of nurse managers’ experiences of upward bullying; all the information we have is based on international literature. Since the circumstances in which nurse managers are upwardly bullied can vary due to differences in workplace culture and structure, this study uses qualitative research methods to explore the manifestations, reasons, and outcomes of upward bullying among managers within Chinese nursing organisations with the aim of finding solutions that can improve the clinical environment and enhance their managerial effectiveness.

2. Methods

2.1. Design. We adopted a descriptive, qualitative study using a semistructured interview method. Qualitative research methods, such as semistructured interviews, are well suited for data collection and analysis of real-life bullying phenomena. This work complied with Tong and colleagues’ recommendations [22]. We thus adopted this method to help us identify the manifestations, causes, and outcomes of upward bullying experienced by nurse managers.

2.2. Sample. This study was conducted within the geographical limits of Wuhan, Hubei Province, China. Purposive sampling was used to recruit 12 nurse managers from two tertiary general hospitals and one secondary general hospital. Inclusion criteria were the following: (a) registered nurses; (b) having responsibility for staff; and (c) providing informed consent to participate in the study. Exclusion criteria included (a) nurses not on duty due to casual leave, sick leave, maternity leave, etcetera; (b) being unwilling to participate in the study; and (c) having experienced adverse psychological impact in the past 3 months, such as divorce. The previous study excluded participants with psychological distress to minimise the influence of unrelated factors [11].

2.3. Data Collection. A semistructured interview guide was developed, which was preliminarily drafted on the basis of a literature review and panel discussion and finalised after consultation with a nursing management expert and two pre-interviewees. The questions are presented in Table 1.

Interviews were conducted between June and August 2023, using a one-to-one semistructured in-depth interview method to collect data. Since previous research has found that telephone contact is more convenient for respondents [23] and we wanted to accommodate the busy schedules of nurse leaders, we presented the participants with the choice of face-to-face or online telephone interviews. Before the start of each interview, we explained the study’s purpose, content, and methodology to the participants, assured them of the confidentiality of their information, and obtained their informed consent. We used an outline to guide the main line of inquiry, adjusting the questions flexibly according to the interviewee’s responses. At all times, we

TABLE 1: Interview questions.

-
- (i) Please briefly introduce yourself (age, marital status, length of independent nursing practice, and nursing title)
 - (ii) Have you heard of the term “upward bullying”? What do you understand by “upward bullying”?
 - (iii) Have you ever been the victim of upward bullying or witnessed it among others since becoming a nurse manager?
 - (iv) If you have been exposed to upward bullying, what did you specifically witness or experience?
 - (v) If you have been the victim of upward bullying, why do you think it occurred?
 - (vi) How has upward bullying in the workplace affected you? How do you feel about it?
 - (vii) What measures are in hand to help reduce the incidence of upward bullying in your workplace?
-

avoided directional and inducing questions and encouraged the interviewees to express their true feelings about upward bullying. We stopped collecting data when information saturation was reached and no new concepts emerged [24].

2.4. Data Analysis. The data were analysed using Colaizzi’s seven-step method [25]. All interviews lasted from 24 to 36 minutes, with an average of 30 minutes, and the audio recordings were converted to text within 24 h of the interviews to create separate documents. First, the information was read independently and repeatedly by two researchers to extract relevant and meaningful statements. Next, key information was distilled and summarised so as to identify common characteristics among the statements. We then formed themes from the data and presented the themes in relation to the phenomenon under study, while also identifying responses that indicated similar points of view. Finally, the results were returned to the interviewees to verify the authenticity of the content. In cases of disagreement during data analysis, we reviewed the notes and recordings, and if there was still disagreement, the respondent was re-interviewed until agreement was reached. To assist in analysing the data, Nvivo 12.0 software was used.

2.5. Ethical Considerations. The study was approved by the Ethical Committee of Tongji Medical College, Huazhong University of Science and Technology (No. S044). Our work was conducted in accordance with the Declaration of Helsinki. All the people participating in the research voluntarily agreed to be interviewed and received information about the study as well as a letter of commitment to confidentiality signed by the research team. In addition, the participants all signed an informed consent form in accordance with said participation which indicated their right to discontinue their participation in the study at any time.

3. Results

3.1. Demographic Characteristics of Participants. All 12 respondents in nursing management positions met the inclusion criteria. All participants were female, all had the title of nurse-in-charge, and all had a bachelor’s degree or higher. Among the 12 participants, 11 were the head nurse of the unit and one was the deputy director of the nursing department, and they all managed an indeterminate number of staff. The age range of the participants was between 33 and 41 years with a mean age of 36.6 years. Table 2 presents the general demographics.

3.2. Categories and Themes Emerging from the Data. The interview data provided rich details of how and why nurse managers were bullied by those in subordinate positions during their current period of employment. Based on their narratives, we grouped the data into three categories from which we distilled and summarised eight themes, as shown in Table 3. In the sections that follow, we expand on these categories and themes and provide direct quotations (translated from Chinese) from nurse managers to support our inferences.

3.2.1. Manifestations of Upward Bullying. Manifestations of upward bullying refer to outward forms of bullying by subordinates toward nurse managers expressed in behaviour, words, etc. The main forms of bullying that emerged from this study included verbal aggression, threats, and disregard for authority.

(1) Verbal Aggression. Respondents indicated that they were receptive to ideas from their subordinates if the ideas were constructive and would like to work with their department members to create a better departmental atmosphere and improve the organisational climate. However, some subordinate nurses chose to express their opinions or dissatisfaction by launching verbal attacks, either in person or behind their backs. These attacks took the form of sarcasm, backbiting, and public humiliation. A head nurse said, “When I first took up my post, if there was any disagreement with the nurses, they belittled my ability to do my job and even called me “eye candy”, meaning “impressive but lacking real worth,” which I found demeaning and offensive” (N6). Another one said, “Nurses often talked privately about my lack of fairness and there was no shortage of public dislike for me” (N1).

(2) Imposing Threats. A few respondents claimed that some subordinate nurses would express their dissatisfaction with their job or managers by issuing threats. As a result, nurse managers were most often forced to compromise on their management style and alter their way of speaking. A head nurse who had been in management for 2 years recalled, “This really struck me. At that time, when I made new rules and corrected the young nurse’s missteps, she threatened to stop my management of her by “jumping off the roof”” (N5). Another head nurse said, “Some of the nurses threatened to leapfrog me [i.e., report me] by writing confidential letters. While I know I didn’t make a mistake, I still didn’t want to get myself in trouble” (N10).

TABLE 2: Demographics of participants (N = 12).

Participant no.	Female (F)/male (M)	Age (years)	Education	Professional title	Position	Level of hospital
1	F	39	Bachelor's degree	Nurse-in-charge	Head nurse	Tertiary
2	F	34	Master's degree	Nurse-in-charge	Head nurse	Tertiary
3	F	33	Master's degree	Nurse-in-charge	Head nurse	Tertiary
4	F	38	Master's degree	Nurse-in-charge	Head nurse	Tertiary
5	F	37	Bachelor's degree	Nurse-in-charge	Head nurse	Tertiary
6	F	33	Bachelor's degree	Nurse-in-charge	Head nurse	Secondary
7	F	41	Bachelor's degree	Nurse-in-charge	Head nurse	Tertiary
8	F	37	Master's degree	Nurse-in-charge	Head nurse	Secondary
9	F	40	Master's degree	Nurse-in-charge	Head nurse	Secondary
10	F	38	Bachelor's degree	Nurse-in-charge	Head nurse	Tertiary
11	F	33	Bachelor's degree	Nurse-in-charge	Deputy director of the nursing department	Secondary
12	F	36	Master's degree	Nurse-in-charge	Head nurse	Tertiary

TABLE 3: Summary of categories and themes.

Categories	Themes
Manifestations of upward bullying	Verbal aggression
	Imposing threats
	Diminished authority
Reasons for upward bullying	Conflicts of interest
	Differences in position
	Excessive workload
Outcomes of upward bullying (Positive and negative)	Self-reflection and improvement Sadness, anger, loss of trust, etcetera

(3) *Diminished Authority*. Authority typically confers a certain prestige and credibility in the minds of subordinates, although not always. Respondents indicated that subordinate nurses would challenge and undermine their authority as leaders in various ways. One manager said, “She would not follow my orders or instructions and even ignored me” (N2). Another head nurse explained her situation in these words, “I was treated with indifference and [the subordinate nurse] was not supportive of my decisions; she even tarnished my image in front of other nurses and instigated opposition toward me, which made my management job more difficult” (N7).

3.2.2. *Reasons for Upward Bullying*. Reasons for upward bullying refer to the conditions that cause or trigger bullying of nurse managers by subordinates. This study found three factors that prompted bullying: conflicts of interest, differences in position, and excessive workload.

(1) *Conflicts of Interest*. Respondents revealed that conflicts of interest, both between individuals and between individuals and the collective, was one reason for upward bullying. A new manager claimed, “The new head nurse is bound to change some of the management mode. And the nurses who have taken the “bonus” of the previous manager will have a gap in their hearts, thinking that their benefits have changed from more to less” (N3). Other respondents mentioned, “Meeting everyone’s needs is difficult to balance. Nurses resent me when they notice small inequalities” (N8). One manager said, “Some people think nursing is just a job and are not willing to make compromises for the sake of collective progress, which makes my work hard” (N12).

(2) *Differences in Position*. Some respondents pointed to conflicts that arise due to differences in the scope of work between nurses and managers. The deputy director of the nursing department explained, “I am in a position where I have to consider things on a more macro level. Some nurses are not mature enough to understand my intentions, and this leads to misunderstandings” (N11). A head nurse said, “The work mentality is different. For example, there are requirements for the placement of oxygen tanks, and some nurses think it’s most convenient to put them somewhere, but I will ask them to change the placement from the perspective of management, and that’s when we disagree” (N4).

(3) *Excessive Workload*. One external reason for upward bullying is the heavy workload of nurses, which leads to higher physical and mental stress and emotional backlog. A head nurse sighed, “At present, there is a shortage of human resources in the department; nurses work night shifts frequently, and they are physically and mentally exhausted. As a manager, I want to schedule shifts for my staff more effectively to reduce the burden, but the workload is objective and cannot be changed” (N9).

3.2.3. *Outcomes of Upward Bullying*. Outcomes of upward bullying refer to its effects on victims and organisations. This study grouped outcomes into two main categories: positive and negative outcomes. The following sections discuss the themes that were found within each of these categories.

(1) *Self-Reflection and Improvement (Positive Outcomes)*. Managers suggested that their experiences of upward bullying spurred them to engage in self-reflection so as to improve themselves and their practices. Specific actions included taking the initiative to improve their management skills, reinventing themselves, identifying and solving problems at work, and improving their mindset. The deputy director of nursing reflected, “Management work is not infallible, all things have room for improvement. Why people are sometimes in a bad mood is something I need to think about, and I will take the time to work on myself” (N11). One manager said, “I have not only asked senior nurse managers for advice on how to manage and communicate with my subordinates, but I have also taken relevant courses and referred to relevant books” (N2).

(2) *Sadness, Anger, Loss of Trust, Etcetera (Negative Outcomes)*. The negative effects of bullying behavior are unavoidable. On the individual side, the above behaviors can bring anger, sadness, and other emotions to nurse managers, depleting emotional resources; increase the pressure of managing and coordinating work; and also affect the establishment of managers’ personal authority, damaging leadership charisma and trust between supervisors and subordinates. On the organisational side, bullying behavior can affect the atmosphere of the department and undermine team cohesion. As two managers noted wearily, “It does come with a sense of loss and chills” (N12, N7). Another manager stated quite plainly, “If the abuser is someone who is a strong communicator and is used to complaining to others, it can disrupt the team atmosphere and reduce my managerial effectiveness” (N8).

4. Discussion

In this study, we used qualitative research techniques to explore nurse managers’ experiences with upward bullying in Chinese nursing organisations. The responses of 12 managers allowed us to determine that upward bullying does indeed exist in these organisations, and that there are both similarities and contrasts with findings from other regions. As WHO argues, bullying is a multifaceted and significant

public health problem, which is detrimental to creating a healthy, person-centred work environment in healthcare organisations.

When asked if they were aware of upward bullying, 75% of the respondents paused to reflect on the question. They indicated that they were more familiar with “horizontal violence” as well as “downward bullying” and that they were unaccustomed to viewing themselves from the perspective of a victim with respect to workplace bullying. After being informed of the definition of upward bullying, managers acknowledged that they did struggle with interpersonal conflicts with their subordinates, which caused some distress in their work environment and posed an obstacle to work advancement. In China, society is characterised by differentiated positions, and managers can usually achieve goals and solve problems quickly by relying on the authority invested in them [26]. However, this study shows that the ability of nurse managers to cultivate the charisma needed of a manager and to develop rapport and trust with subordinate nurses is significantly impeded by various forms of upward bullying, including verbal abuse, threats, fabrication of ratings, and deliberate negative feedback [15].

In line with the results of this study, the reported causes of upward bullying in the literature include an inflexible and heavy workload, differences in education and mindset, as well as jealousy and other emotions [17, 27]. It is worth noting that one of the themes emerging from the data in this study was “conflicts of interest,” which were manifested mainly in the differences in benefits that individuals receive and in the interests between individuals and organisations. There is a consensus among scholars that bullying is easier to comprehend when the organisational context in which it occurs is taken into account [28]. Since collectivism is one of the key social values of Chinese culture, individuals place high priority on relations with others and with the collective [29]. Chinese organisations guide and run teams with the goal of integrating individuals into the collective, and many individuals will voluntarily sacrifice their individual interests for the sake of the collective if harmony cannot otherwise be achieved [30]. With respect to organisational advancement, nursing managers want to promote their teams and units, which invariably mean adding to the burden placed on staff nurses. In response, staff nurses will sometimes accuse the nurse manager of implementing measures that violate their interests and engage in a number of bullying tactics to vent their frustration.

In addition, our findings are consistent with other studies showing that bullying has a variety of detrimental repercussions on nurse managers, including dwindling emotional resources, decreased productivity, poor physical health, and even jeopardised patient safety [15, 31]. When managers are the target of subordinates’ bullying, they themselves can be in a state of information disconnect, unable to effectively coach and manage their team. Struggling to take control of the whole team, they can become reactive, with effects that include organisational mismanagement and higher propensity to quit [15, 17].

Interestingly, the Chinese respondents in this study retained a positive attitude despite the upward bullying. They continued to pursue additional education, behave

positively, and serve the public in an effort to strengthen their personal charisma as the “head” of the unit. Research indicates that the types, causes, and manifestations of bullying in the nursing field have undergone staged changes over the last 4 decades, with nursing management having had a role to play in addressing the problem of bullying [32]. Nurses who take on management roles may be able to build up personal and organisational resources by taking positive action, as did respondents N11 and N2. Taking a proactive stance allows them to gain experience in managing upward bullying issues that are closely related to their own, as there is limited information on upward bullying in the Chinese nursing field. This article can help nurse managers to understand the ways in which upward bullying behaviour manifests itself in the profession and, most importantly, prompt managers to develop the necessary skills to identify, manage, and prevent bullying from subordinates in order to maintain their managerial effectiveness.

While antibullying laws and zero-tolerance campaigns have been tried in some countries to enable nurse managers to respond more adequately to the devastation caused by bullying, they fail to address the most fundamental problems [33]. According to Parchment and Andrews [15], nurse managers with authentic leadership styles report less bullying. Therefore, managerial training programs oriented to leadership development and improving interpersonal skills may be one way to strengthen the leadership skills of nurses and reduce bullying. However, addressing upward bullying in nursing is not solely the responsibility of nurse managers. Supervised senior nurses have a wealth of workplace experience and interpersonal communication skills that allow them to bridge the communication gap with managers and serve as a benchmark for younger nurses in China. Therefore, senior nurses also need to demonstrate leadership in their professional roles and show respect for their supervisors, colleagues, and the profession [32]. By role-modelling appropriate behaviour, they can help to reduce the incidence of upward bullying.

5. Limitations

The participants in this study were all from hospitals in Wuhan, Hubei Province, and further research should be conducted to expand the representativeness of the sample. Moreover, the study participants were all female, and whether gender is a factor in upward bullying remains to be explored. Finally, qualitative research methods cannot determine the true frequency of upward bullying in the Chinese nursing field.

6. Conclusion

In China, upward bullying is a reality in the field of nursing, with nurse managers encountering various degrees and types of bullying just as they do in other countries. In addition to objective changes in workload and psychological displeasure, other factors also trigger this type of bullying behaviour. Some Chinese nurse managers are strong-willed and responsible. They are able to turn a negative situation

into an opportunity for growth. Creating a positive work environment for them that facilitates management, however, is still something to be emphasised.

7. Implications for Future Nursing Management Research

Limited evidence exists of upward bullying in the field of nursing, especially in the Chinese context. This study can contribute to an understanding of why such bullying occurs and what its outcomes entail. Given that bullying behaviour is linked to turnover, we have concerns that the continuation of upward bullying will have a similar impact on the retention and turnover rates of nurse managers in China, which would pose a threat to organisational cohesion and management. We suggest, therefore, that the relationship between turnover rates and exposure to upward bullying among nurse managers in China be further investigated.

It is hoped that the findings of this study will enrich future research in the fields of nursing management and workplace health in China and inform large-scale quantitative studies that investigate the issue of upward bullying. And we anticipate that this study will contribute to the development of interventions and strategies to manage and address the upward bullying of nurse managers and that these actions taken will improve management effectiveness and the nursing practice environment. In addition, the conclusions of this study prompt us to rethink the importance of professional literacy training in nursing education.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Ethical Approval

The study was approved by the Ethical Committee of Tongji Medical College, Huazhong University of Science and Technology (No. S044).

Conflicts of Interest

All authors declare no conflicts of interest.

Authors' Contributions

Jia He conceptualized the study, contributed resources, and reviewed and edited the manuscript; Yuhan Wang was responsible for conceptualization and methodology and prepared the original draft; Yangjing Wang and Xin Li were responsible for interview and data curation; Xueqin Guo was responsible for methodology and data analysis; Huan Jin was responsible for conceptualization, resources, and supervision; Lijuan Xiong was responsible for conceptualization, supervision, and project administration. All authors read and approved the final version for submission. Jia He and Yuhan Wang are co-first authors.

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Research Article

Ward-Specific Probabilistic Patterns in Temporal Dynamics of Nursing Demand in Japanese Large University Hospital: Implication for Forecasting and Resource Allocation

Rie Tajika ¹, Yoshiaki Inoue ², Keisuke Nakashima ³, Takako Yoshimi ¹,
Nobue Arimoto,¹ Haruna Fukushige ¹, Yoko Taniura,⁴ Tomoyuki Iwasaki,⁴
and Atsue Ishii ¹

¹Department of Nursing, Graduate School of Health Sciences, Kobe University, 7-10-2 Tomogaoka, Suma-ku, Kobe, 654-0142, Hyogo, Japan

²Department of Information and Communications Technology, Graduate School of Engineering, Osaka University, 2-1 Yamadaoka Suita, Osaka, 565-0871, Japan

³Department of Medical Informatics, Graduate School of Medicine, Osaka University, 2-2 Yamadaoka Suita, Osaka, 565-0871, Japan

⁴Division of Nursing, Osaka University Hospital, 2-15 Yamadaoka Suita, Osaka, 565-0871, Japan

Correspondence should be addressed to Atsue Ishii; atsue@people.kobe-u.ac.jp

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As global populations age, a looming nursing shortage is anticipated to become a critical issue. Charge nurses have the responsibility of optimally allocating nursing resources to ensure the quality of patient care during a shift. Therefore, an accurate estimate of nursing demand is crucial. However, the ability to forecast future nursing demand remains underdeveloped, mainly because the nature of nursing demand is highly individualized and does not follow a definitive pattern. In practice, the nursing demand is often perceived as unpredictable, leading to an ad hoc approach to staffing. The primary objective of our study is to demonstrate that longitudinal data analysis can reveal strong statistical regularities in the temporal dynamics of nursing demand. This approach not only provides new possibilities for efficient resource allocation but also paves the way for data-driven prediction of nursing demand. Our study uses Sankey diagrams to visualize the temporal dynamics of nursing demand within each ward for each fiscal year, representing these dynamics as an overlay of trajectories from multiple individual patients. Consequently, our study reveals ward-specific statistical regularities in the temporal dynamics of nursing demand. In one ward, approximately 25% of patients experienced an increase in nursing demand from 1 to between 6 and 9 points from the second to the third day of hospitalization, while in another, only 0.1% showed such an increase. These findings suggest that patients admitted to the wards tend to exhibit a certain probabilistic change in nursing demand. This study can predict probabilistically the temporal variation of nursing demand among patients in the coming years by analyzing data on the temporal changes in nursing demand over the past years. Our findings are expected to significantly influence the forecasting of nursing demand and the estimation of nursing resources, leading to data-driven and more efficient nursing management.

1. Introduction

As societies globally progress towards a superaging demographic, a looming nursing shortage is anticipated to become a critical issue. While it is imperative to expand nursing education to augment medical resources, the onus is

also on charge nurses, who lead their nursing units during a shift, to ensure the optimal allocation of these resources [1]. This is paramount to maintaining the necessary quality of patient care, as research shows that increasing a nursing workload often leads to worse patient outcomes [2–4]. However, challenges remain in applying these findings to

clinical practice [5]. To achieve more realistic staffing, optimized nurse staffing has been examined, taking into account stakeholder decision-making involving nurses and patients [5, 6], as well as cost considerations [7]. Furthermore, a nonlinear staffing model has been proposed to address the complex relationships caused by path dependencies and feedback loops in staffing factors [8]. Among the complex factors, nursing demand is particularly important as a core factor due to its significant impact on various nursing resources [8]. Consequently, accurately estimating nursing demand emerges as a fundamental challenge that must be addressed.

Efforts to quantify nursing demand have been undertaken in several countries. The Nursing Activities Score (NAS) is utilized to measure both direct and indirect nursing activities in various countries [9, 10]. In Finland, the Oulu Patient Classification (OPC) is employed to evaluate the volume and intensity of nursing care provided to each patient [11, 12]. In Japan, the Intensity of Nursing Care Needs (INCN) serves as a measure of nursing demand. While progress has been made in quantifying current nursing demand, the ability to forecast and predict future demand remains under-researched.

A key challenge in estimating nursing demand lies in the highly individual nature of patient care demand [13]. Patients present with a wide array of physical and psychosocial backgrounds, leading to considerable variability in nursing demand. As a result, the daily nursing care required throughout a patient's hospital stay until discharge does not follow a simple, deterministic pattern. This variability persists even among patients hospitalized for similar diseases, as care demand can greatly differ from one individual to another. In practice, it is often assumed that nursing demand is inherently unpredictable, leading to an ad hoc approach in the allocation of nursing resources.

To address clinical challenges, many studies have attempted to predict nursing demand based on data. However, factors such as age [14, 15] and emergency situations [14] were not found to be associated with nursing demand. Instead, the relationship with sex varied depending on the situation [14, 15]. Furthermore, although some studies have reported that the length of stay and survival [15, 16] are useful variables, these factors cannot be incorporated into prospective prediction models. One study [13] suggested that nursing demand can help predict which patients will have stable nursing needs in the subsequent shift, but it did not address the ability to predict changes in nursing demand for patients. Less than half of the patients had stable nursing demand. Therefore, the development of a model applicable to all patients is ongoing. Nursing demand changes dynamically, which may complicate staff allocation based on nursing demand [13]. Consequently, it is essential to explore methods to predict dynamic nursing demand effectively.

The primary objective of this paper is to illustrate that longitudinal data analysis can reveal strong *statistical regularities* in the temporal dynamics of nursing demand. This serves as a preliminary step toward solving the nursing demand estimation challenge. Here, the term "statistical regularity" refers to consistent patterns within data that inherently contain

randomness. In other words, it describes empirical phenomena where observations do not yield the same outcome each time yet show statistical stability in their frequency [17].

The influence of patient individuality, which contributes to the diversity of nursing demand, can be statistically encapsulated within these regularities when considering the entire patient population as a collective entity. Successfully identifying these statistical regularities paves the way for formulating nursing demand forecasting and resource allocation as a stochastic, or probabilistic problem. This approach not only opens up new possibilities for efficient resource allocation in nursing management but also provides a data-driven method to anticipate nursing demand despite the seeming unpredictability of individual patient nursing demand over the course of hospitalization days.

In this study, we analyzed three years' worth of data related to item "B" of the INCN from a large Japanese hospital with over a thousand beds. As will be detailed in the Methods section, item "B" of the INCN evaluates patient's activities of daily living (ADL) and cognition. Importantly, nurses often encounter physical strain when caring for patients with low ADL and cognition. Such care tasks typically involve manual handling of patients, including positioning and transfers, which directly contribute to the physical workload experienced by nurses [18–20].

To provide insights that can be useful for nursing staff scheduling [21] and bed management [22], our focus is on the temporal evolution of nursing demand throughout the entire hospitalization period. The key to uncovering statistical regularities from this perspective is the utilization of a visualization tool known as *Sankey diagrams*.

Sankey diagrams, a type of flow diagram, are widely used in fields such as industrial engineering, economics, and finance to visualize the magnitude of various flows. In medical fields, it has been used to investigate usage paths in mobile electronic health record systems [23] or to visualize treatment courses for a group of patients [24]. When the nodes in these diagrams are appropriately aligned, they can provide a clear and comprehensive picture of the dynamic changes in nursing demand throughout the course of a patient's hospital stay. Nurses in clinical practice sites encounter highly individualized patients, which can obscure the regularities inherent in the patient population. Their knowledge is often limited to the patients for whom they are responsible, restricting their ability to gain an overview of nursing demand trends across the entire patient population. However, visualizing nursing demand with Sankey diagrams enables observation of these trends for the entire patient population from a bird's eye view, which allows for capturing the statistical regularities in the nursing demand dynamics of the patient population. As demonstrated in the following sections, this approach presents an effective way to understand the evolution of nursing demand over time.

2. Materials and Methods

2.1. Design and Setting. With Sankey diagrams, we visualized statistical patterns in the trajectories of nursing demand for each ward for each fiscal year. We analyzed the results from the following two perspectives (Figure 1):

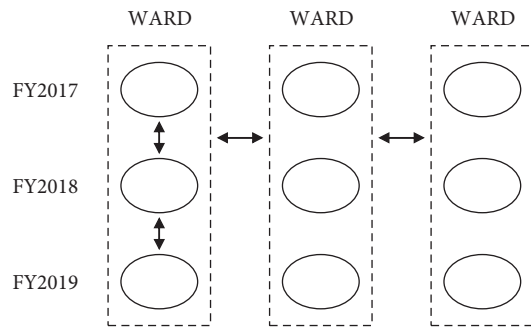


FIGURE 1: Overview of comparative analysis of patterns in the trajectories of nursing demand by fiscal year and ward. (1) Comparing the trajectories across fiscal years for each ward (↑↓). (2) Comparing the trajectories between different wards (↔).

- (1) For each ward, we assessed the similarity/dissimilarity in the visualized trajectories of nursing demand across fiscal years
- (2) We compared the visualized trajectories of nursing demand between different wards

2.2. Target Hospital. This study focused on a large university hospital in Japan with over a thousand beds. As a university hospital, the targeted hospital serves multifaceted roles: it functions as an educational institute for fostering medical professionals, as a research institute for the innovation of novel medical technologies, and as a central regional healthcare institution offering advanced healthcare provisions. Consequently, the hospital is responsible for treating patients requiring advanced medical care. In the wards studied, the ratio of the number of patients to that of nurses is 7:1.

2.3. Data Collection

2.3.1. Intensity of Nursing Care Needs. The INCN is an indicator used in Japan to measure the demand for nursing care. It comprises three components: items “A,” “B,” and “C.” Item “A” evaluates the expertise of nurses and encompasses subitems related to monitoring and treatment procedures, such as pressure ulcer care and syringe pump management. Item “B” assesses the level of caregiving for recuperation administered by nurses. It includes subitems that evaluate the patient’s ADL and cognition. Item “C” appraises surgical procedures considered urgent from a medical standpoint. It is scored based on the type and volume of medical procedures undertaken, such as craniotomy or open chest surgery, and it is assessed within a specific time frame in postprocedure. Nurses evaluate the nursing demand for each patient every day. The electronic medical record stores the resulting INCN scores, thereby preserving the data as a time series.

In this study, we utilized the score for item “B” of the INCN of individual patients. As mentioned above, Item “B” evaluates a patient’s ADL and cognition (Table 1). Each score is recorded once a day, reflecting the most severe condition observed between 00:00 and 23:59. For the “risk behavior,” if

patients engage in such behaviors within the past seven days, nurses mark “display risk behavior” for the target date. Risk behaviors include self-extubation during treatment or examination, falls, self-injury, as well as other behaviors that would lead to dangerous actions if left unaddressed. The score of item “B” ranges from 0 to 12, with higher scores indicating the need for more extensive or diverse types of nursing care.

2.3.2. Target Data. This study utilized daily scores of Item “B” in the INCN as an indicator of nursing demand. We focused on scores from the first day of hospitalization (hereafter referred to as day 1) to day 18 for each patient. This decision stemmed from the fact that inwards operating under the 7:1 patient-to-nurse ratio, the average patient stay is optimized to be within 18 days. This study population comprised patients who were admitted to the target hospital during any of the following periods: from April 1, 2017, to March 14, 2018; from April 1, 2018, to March 14, 2019; and from April 1, 2019, to March 14, 2020, reflecting the fact that fiscal years in Japan start at April 1. Furthermore, these patients had to occupy general beds in either the Orthopaedic Surgery Ward, the Neurosurgery Ward, or the Cardiovascular Medicine Ward for at least one day before day 18. We treated each admission date for the same patient as a separate case. We excluded patients with missing score data for at least one day between day 1 and day 18.

We chose the three wards categorized as musculoskeletal, neurology, and internal medicine departments. This selection was premised on the fact that the patients in these wards necessitated varied types of nursing care, aligning with their diverse diseases and corresponding treatment plans, which would result in different natures of nursing demand.

Many patients in the Orthopaedic Surgery Ward undergo procedures such as arthroplasty, tendon reconstruction, or tumor resection. In the Neurosurgery Ward, a large number of patients receive treatments such as craniotomy for brain tumors, vascular embolization, and stent placement. The Cardiovascular Medicine Ward sees many patients who require medication, cardiac catheterization, and in some cases, a heart transplant.

Along with the scores of item “B” in the INCN, we collected the following attributes for each record: the date, patient ID, admission date, discharge date, and details of the inpatient wards and beds occupied by the patient.

2.4. Ethical Considerations. Ethical approval for this study was granted by our hospital’s Ethics Committee (approval no. 22251 (T2)). All participant data were anonymized to ensure the protection of their personal information. Information about the study was made available to potential participants via the hospital’s website, providing the option for patients who stayed at the hospital during the study period to opt out if they wished.

2.5. Data Analysis. Figure 2 shows the flowchart of data analysis in our study. We collected data that met specific criteria, as mentioned previously in the Target Data section.

TABLE 1: Criteria for the score for item “B” in the intensity of nursing care needs.

System	Score		
	0	1	2
Rolling overact	Can do it	Can do it if holding onto something	Cannot do it
Transferring	Independent	Partial assistance	Full assistance
Oral health	Independent	Assistance	—
Dietary intake	Independent	Partial assistance	Full assistance
Changing clothes	Independent	Partial assistance	Full assistance
Instruction for medical care and treatment	Compliance with instruction	Noncompliance with instruction	—
Risk behavior	Avoid risk behavior	—	Display risk behavior

We processed the data to account for patient transfers to other wards and discharges, which allowed for the analysis of data for each ward over the course of hospitalization. We calculated the number and proportion of patients who transitioned from one point to another each fiscal year in each ward. These trends were visualized using a type of Sankey diagram, which illustrates the flow and transition of scores among patients. We conducted a comparative analysis of the results from the Sankey diagrams and the number of patients within the same ward across different fiscal years. In addition, we compared the results from the Sankey diagrams and the proportion of patients across different wards.

In this analysis, Python version 3.11.7 served as the primary programming language [25]. We use Pandas 2.1.1 [26] and NumPy 1.25.0 [27] for the identification of the eligible patient population and the quantification of the total number of eligible patients and specific conditions within this population. Furthermore, we use Plotly 5.15.0 [28, 29] to create the Sankey diagrams.

2.5.1. Data Processing. Each patient was assigned a daily score ranging from 0 to 12 points. Some patients were admitted to more than one ward or specialized beds such as Coronary Care Units during their hospital stay. If patients stayed in other wards or specialized beds, we replaced the scores with the label “staying in other wards or specialized beds.” For instance, when targeting a single ward and analyzing one patient, if this patient stayed in the target ward with a score of 0 points on day 1, in another ward or specialized bed with a score of 1 point on day 2, and back in the target ward with a score of 2 points on day 3, then we modified the sequence “0 points, 1 point, and 2 points” to “0 points, “staying in other wards or specialized beds,” and 2 points.” When a discharge was recorded, any data after the discharge record’s entry date were labeled as “discharged.”

2.5.2. Calculation. For each patient, the period of analysis was set to 18 days, as mentioned above, based on the average patient stay. Let d ($d \in \mathcal{D}$) denote the number of days elapsed after the admission to the hospital, where $\mathcal{D} = \{1, 2, \dots, 17\}$. Let \mathcal{E} and \mathcal{S} denote the set of eligible patients and the set of daily scores including discharge, where $\mathcal{S} = \{0, 1, \dots, 12\} \cup \{\text{staying in other wards or specialized beds, discharged}\}$. For $e \in \mathcal{E}$ and $i \in \mathcal{S}$, we define an indicator function $I_i(e, d)$ as follows:

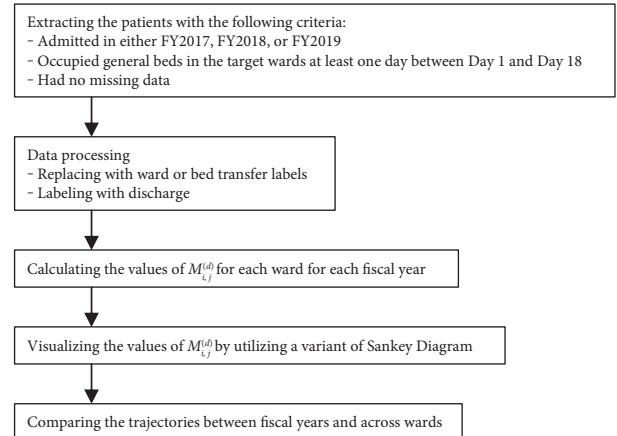


FIGURE 2: Flowchart for data analysis.

$$I_i(e, d) = \begin{cases} 1, & \text{if patient } e \text{ scored } i \text{ on Day } d, \\ 0, & \text{otherwise.} \end{cases} \quad (1)$$

The total number $M_{i,j}^{(d)}$ of patients who scored i on day d and scored j on day $d+1$ is then given by

$$M_{i,j}^{(d)} = \sum_{e \in \mathcal{E}} I_i(e, d) I_j(e, d+1). \quad (2)$$

With $M_{i,j}^{(d)}$ and the total number N_e ($N_e = |\mathcal{E}|$) of eligible patients, the proportion $P_{i,j}^{(d)}$ of patients who scored i on day d and scored j on day $d+1$ among eligible patients is calculated by

$$P_{i,j}^{(d)} = \frac{M_{i,j}^{(d)}}{N_e}. \quad (3)$$

2.5.3. Visualization. Sankey diagrams can visualize the flow of data between different stages. These diagrams clearly represent the distribution and transition of data points throughout the various phases by depicting the movement of quantities or information between numerous nodes in a system. The layout of the diagram is typically optimized and arranged automatically [30]. This method facilitates an intuitive understanding of the complex relationships and interactions within the dataset.

Unlike conventional automatically arranged Sankey diagrams, we arranged the vertical axis in descending order of scores for item “B,” while we aligned the horizontal axis

with equal intervals to depict the elapsed days after hospitalization. Nodes are represented by rectangles indicating the score, and the flows between them are depicted by curves leading from source to target nodes. The volume of each flow, represented by the $M_{i,j}^{(d)}$, is indicated by the thickness of the curve. In other words, the curve's thickness corresponds to the number of patients whose scores transitioned from i on day d to j on day $d + 1$. Note that, the Sankey diagram is composed of the volumes of flows between two days, which, in aggregation, also suggests typical trajectories of nursing demand. We visualized the values of $M_{i,j}^{(d)}$ for each ward for each fiscal year to investigate the statistical regularities in the temporal dynamics of nursing demand.

2.5.4. Trajectory Comparison. The thickness of the flows corresponds to both the probability of the score transitioning and the volumes of flows. With the resulting Sankey diagrams and $M_{i,j}^{(d)}$ values, we compared the trajectories of the scores of the patient population between different fiscal years for each ward. Furthermore, we incorporated $P_{i,j}^{(d)}$ values alongside $M_{i,j}^{(d)}$ to compare the trajectories of the scores between different wards. Comparing the trajectories allows for the inference of the existence of probabilistic patterns in score transition.

3. Results

The basic characteristics of the target patients are shown in Table 2. In the Orthopaedic Surgery Ward, the eligible patient count was 684, 688, and 691 in the fiscal years 2017, 2018, and 2019, respectively. In the Neurosurgery Ward, the numbers were 839, 873, and 959 for those years, respectively. For the Cardiovascular Medicine Ward, there were 994, 998, and 898 patients in those years, respectively. The proportion of these patients was 99.3%. In the Orthopaedic Surgery Ward, the majority of patients were female, with a mean age in the mid-50s, consistently across three fiscal years. In the Neurosurgery Ward, the sex ratio was almost equal, with a mean age in the late 50s, also consistently across three fiscal years. In the Cardiovascular Medicine Ward, the majority of patients were male, with a mean age in the mid-60s, consistently over the same period. The median scores on day 1 were 1 point in the Orthopaedic Surgery Ward, almost 1 point in the Neurosurgery Ward, and 0 points in the Cardiovascular Ward, respectively.

The number of inpatients gradually decreased over the course of hospitalization in all wards, primarily due to patients being discharged as their hospital stays progressed. The nature of changes in scores varied across the different wards (Table 3).

We will present results from the following two perspectives:

- (1) The statistical regularities in temporal dynamics of nursing demand across fiscal years within each ward
- (2) The ward-specific feature of the statistical regularities in temporal dynamics of nursing demand

3.1. The Statistical Regularities in Temporal Dynamics of Nursing Demand across Fiscal Years within Each Ward

3.1.1. The Orthopaedic Surgery Ward. All trajectories of the Orthopaedic Surgery Ward are shown in Figure 3. The x -axis represents the hospitalization day, and the y -axis represents the scores. A higher number of points indicates a greater nursing demand. The flows between the scores are depicted by curves leading from the source to the target. The thickness of each curve indicates the volume of the flow. The primary patterns observed in this ward are as follows. On day 1, a substantial number of patients had scores ranging from 0 to 2 points, with totals of 613, 608, and 608 in the fiscal years 2017, 2018, and 2019, respectively. From day 1 to day 2, the majority exhibited stable score trajectories: specifically, 446, 435, and 415 patients experienced a score change of 1 point or less in the fiscal years 2017, 2018, and 2019, respectively.

From day 2 to day 3, there was a noticeable rise in patient scores, especially among those whose scores shifted from 0 to between 6 and 9 points, numbering 154, 173, and 206 in the fiscal years 2017, 2018, and 2019, respectively. From day 3 to day 4, these patients' scores stabilized, specifically transitioning from between 6 and 9 points to between 6 and 8 points, with 232, 257, and 267 patients following these trajectories in the fiscal years 2017, 2018, and 2019, respectively. From day 4 to day 5, a declining trend was observed. In particular, 145, 128, and 136 patients with scores between 6 and 8 points saw their scores fall around 4 or 5 points in the fiscal years 2017, 2018, and 2019, respectively.

Beyond day 5, score changes from one day to the next were insignificant. For example, from day 5 to day 6, the scores of 385, 393, and 393 patients remained unchanged in the fiscal years 2017, 2018, and 2019, respectively. Moreover, from day 11 to day 12, the scores of 398, 427, and 401 patients did not change.

In the fiscal year 2017, there were instances of patients following an increasing trajectory, with scores rising from 7 to 10 points between day 9 and day 10, and from 10 to 11 points between day 10 and day 11. Subsequently, for several days, the score remained constant, settling at a high value. In fiscal year 2018, patient trajectories were seen to surpass 10 points between day 3 and day 12. In fiscal year 2019, some patients exhibited an increasing trajectory, with scores rising from 7 to 10 points between day 10 and day 11. Following this surge, the scores plateaued and remained unchanged for several days.

3.1.2. The Neurosurgery Ward. All trajectories of the Neurosurgery Ward are shown in Figure 4. The primary patterns observed in this ward are as follows. Scores of 0 or 1 point were consistent throughout the hospitalization period, suggesting that patients who scored 0 or 1 point on a certain day were more likely to maintain similar scores the next day. Particularly, from day 1 to day 2, 412, 414, and 410 patients followed such trajectories in the fiscal years 2017, 2018, and 2019, respectively. Furthermore, from day 2 to day 3, the numbers of patients with these trajectories were 303, 283, and 257 in the fiscal years 2017, 2018, and 2019, respectively. The remaining patients exhibited diverse trajectories; their progression was intricate and multifaceted.

TABLE 2: Descriptive characteristics of the patients.

	Orthopaedic Surgery Ward			Neurosurgery Ward			Cardiovascular Medicine Ward		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
<i>Patient, number</i>									
All	684	697	706	840	879	967	1000	1006	899
Eligible	684	688	691	839	873	959	994	998	898
Excluded	0	9	15	1	6	8	6	8	1
Age, mean (SD)	54.2 (20.2)	54.6 (20.8)	56.1 (20.8)	57.4 (17.9)	57.3 (18.3)	57.7 (18.3)	65.0 (16.9)	65.8 (16.0)	66.0 (15.8)
<i>Sex, number (%)</i>									
Male	257 (37.6)	261 (37.9)	266 (38.5)	446 (53.2)	456 (52.2)	454 (47.3)	637 (64.1)	688 (68.9)	582 (64.8)
Female	427 (62.4)	427 (62.1)	425 (61.5)	393 (46.8)	417 (47.8)	505 (52.7)	357 (35.9)	310 (31.1)	316 (35.2)
Score on day 1, median (Q1–Q3)	1.0 (0.0–1.0)	1.0 (0.0–1.0)	1.0 (0.0–1.0)	0.0 (0.0–2.0)	1.0 (0.0–3.0)	1.0 (0.0–3.0)	0.0 (0.0–1.0)	0.0 (0.0–1.0)	0.0 (0.0–1.0)

SD, standard error; Q1, first quartile; Q3, third quartile.

TABLE 3: Temporal changes in inpatient numbers and scores.

Day	2017			2018			2019		
	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	
Orthopaedic Surgery Ward									
1	684 (100.0)	1.0 (0.0-1.0)	688 (100.0)	1.0 (0.0-1.0)	691 (100.0)	1.0 (0.0-1.0)	691 (100.0)	1.0 (0.0-1.0)	
10	526 (76.9)	2.0 (1.0-4.0)	517 (75.1)	2.0 (1.0-3.0)	495 (71.6)	2.0 (1.0-3.0)	495 (71.6)	2.0 (1.0-4.0)	
18	421 (61.5)	2.0 (1.0-3.0)	410 (59.6)	1.0 (1.0-3.0)	342 (49.5)	1.0 (1.0-3.0)	342 (49.5)	1.0 (1.0-3.0)	
Neurosurgery Ward									
2017									
Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)
1	839 (100.0)	0.0 (0.0-2.0)	873 (100.0)	1.0 (0.0-3.0)	959 (100.0)	1.0 (0.0-3.0)	959 (100.0)	1.0 (0.0-3.0)	
10	477 (56.9)	1.0 (0.0-4.0)	457 (52.3)	1.0 (0.0-5.0)	497 (51.8)	1.0 (0.0-5.0)	497 (51.8)	1.0 (1.0-5.0)	
18	264 (31.5)	1.0 (0.0-6.0)	238 (27.3)	2.0 (1.0-6.0)	261 (27.2)	2.0 (1.0-6.0)	261 (27.2)	2.0 (1.0-5.0)	
Cardiovascular Medicine Ward									
2017									
Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)	Inpatients, number (%)	Score, median (Q1-Q3)
1	994 (100.0)	0.0 (0.0-1.0)	998 (100.0)	0.0 (0.0-1.0)	898 (100.0)	0.0 (0.0-1.0)	898 (100.0)	0.0 (0.0-1.0)	
10	348 (35.0)	0.0 (0.0-2.0)	331 (33.2)	0.0 (0.0-3.0)	342 (38.1)	0.0 (0.0-3.0)	342 (38.1)	0.0 (0.0-2.0)	
18	207 (20.8)	1.0 (0.0-2.0)	203 (20.3)	0.0 (0.0-2.0)	203 (22.6)	0.0 (0.0-2.0)	203 (22.6)	0.0 (0.0-2.0)	

Q1, first quartile; Q3, third quartile.

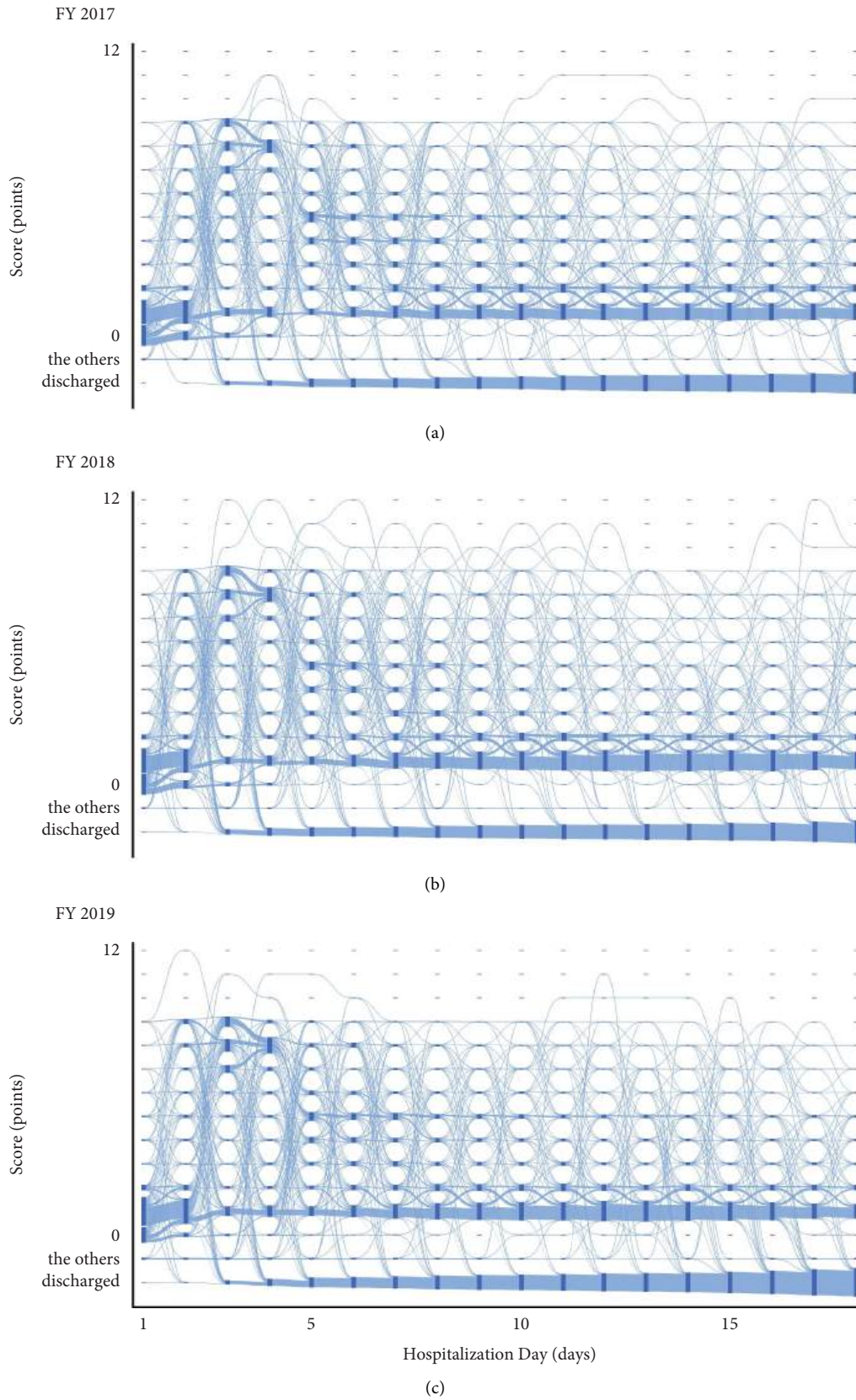


FIGURE 3: The trajectories of nursing demand in the Orthopaedic Surgery Ward for fiscal year (a) 2017, (b) 2018, and (c) 2019. Nodes are represented by rectangles indicating the score. The flows between them are depicted by curves leading from the source to the target nodes. The volume of each flow is indicated by the thickness of the curve. “The others” indicates “staying in other wards or specialized beds.”

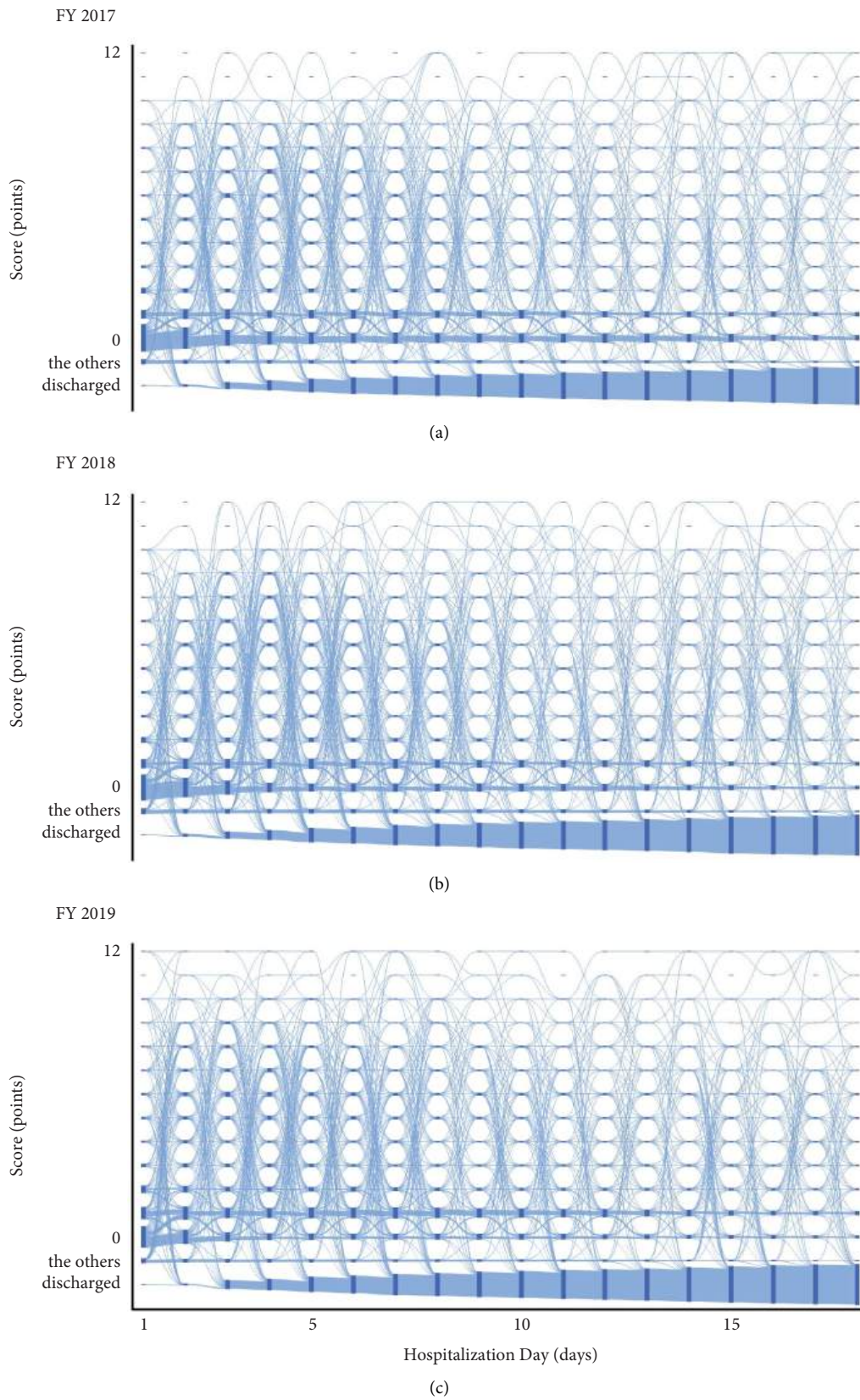


FIGURE 4: The trajectories of nursing demand in the Neurosurgery Ward for fiscal year (a) 2017, (b) 2018, and (c) 2019. Nodes are represented by rectangles indicating the score. The flows between them are depicted by curves leading from the source to the target nodes. The volume of each flow is indicated by the thickness of the curve. “The others” indicates “staying in other wards or specialized beds.”

During the hospitalization period, trajectories reaching scores between 10 and 12 points were observed daily. From day 1 to day 2, the numbers of patients experiencing these trajectories were 8, 11, and 15 in the fiscal years 2017, 2018, and 2019, respectively. From day 10 to day 11, the numbers of patients were 10, 13, and 9 in the fiscal years 2017, 2018, and 2019, respectively. From day 17 to day 18, 19, 11, and 8 patients experienced these trajectories in the fiscal years 2017, 2018, and 2019, respectively.

Notably, we observed trajectories that led from high scores, such as between 9 and 12, to “discharged.” During the hospitalization period, a total of 10, 16, and 24 patients experienced these trajectories in the fiscal years 2017, 2018, and 2019, respectively. We also observed trajectories from “staying in other wards or specialized beds” to high scores, between 9 and 12. From day 1 to day 2, the numbers of patients following these trajectories were 6, 5, and 8 in the fiscal years 2017, 2018, and 2019, respectively. From day 13 to day 14, these numbers were 4, 2, and 3 in the fiscal years 2017, 2018, and 2019, respectively. Although detailed numbers are provided for only a few days, this phenomenon was consistent, regardless of the day of admission during hospitalization.

3.1.3. The Cardiovascular Medicine Ward. All trajectories of the Cardiovascular Medicine Ward are shown in Figure 5. The primary patterns observed in this ward are as follows. On the first day, many patients (609, 594, and 478 in the fiscal years 2017, 2018, and 2019, respectively) scored 0 points. Approximately half of these patients followed a slightly ascending trajectory, with scores increasing to 1 or 2 points from day 1 to day 2. Specifically, the numbers were 243, 170, and 131 in the fiscal years 2017, 2018, and 2019, respectively. These patients then exhibited a downward trend, with their scores decreasing to 0 from day 2 to day 3, with patient counts of 209, 144, and 108 in the fiscal years 2017, 2018, and 2019, respectively.

A significant number of patients demonstrated patterns leading to “discharge” from day 3 to day 4 and from day 5 to day 6. From day 3 to day 4, 302, 281, and 220 patients were discharged in the fiscal years 2017, 2018, and 2019, respectively. From day 5 to day 6, the discharge numbers were 95, 107, and 94 in the fiscal years 2017, 2018, and 2019, respectively. We also noted trajectories of patients moving from “staying in other wards or specialized beds” to achieving higher scores, typically between 4 and 7 points. For instance, from day 5 to day 6, 12 patients exhibited these trajectories in each fiscal year.

A small proportion of patients followed near-flat trajectories, maintaining extremely high scores, such as between 10 and 12 points, throughout their hospitalization. For example, such trajectories were observed from day 5 to day 6 in the fiscal year 2017; from day 4 to day 5 and from day 15 to day 18 in the fiscal year 2018; and from day 1 to day 3 and from day 8 to day 9 and from day 16 to day 18 in the fiscal year 2019.

3.2. The Ward-Specific Feature of the Statistical Regularities in Temporal Dynamics of Nursing Demand

3.2.1. Trajectories of Scores. Here, scores of 0–2 were classified as low, 3–5 as medium, 6–9 as high, and 10–12 as very

high. This classification was provisional, used solely to describe the trajectory. This classification was used tentatively only to illustrate the characteristics of the trajectory. Trajectories from day 3 to day 4 were compared for low scores, medium scores, high scores, ultra-high scores, and from 0 to discharge in each ward in 2017. In Figure 6, scores are represented as follows: low scores in blue, medium scores in green, high scores in red, ultra-high scores in purple, and scores from 0 to discharge in orange.

In the Orthopaedic Surgery Ward, the largest group of patients exhibited a trajectory between high scores, with 265 patients (38.7%), followed by trajectories between low scores with 164 patients (24.0%), and medium scores with 27 patients (3.9%). There were no patients transitioning between ultra-high scores or from 0 to discharge. In the Neurosurgery Ward, the most common trajectory was between low scores with 314 patients (37.4%), followed by high scores with 110 patients (13.1%), medium scores with 39 patients (4.6%), from 0 to discharge with 22 patients (2.6%), and ultra-high scores with 8 patients (1.0%). In the Cardiovascular Medicine Ward, the most common trajectory was also between low scores with 325 patients (32.7%), followed by trajectories from 0 to discharge with 218 patients (21.9%), medium scores with 33 patients (3.3%), and high scores with 5 patients (0.5%). There were no patients transitioning between ultra-high scores.

Thus, in the Orthopaedic Surgery Ward, unlike other wards, a high percentage of patients transitioned between high scores. Also, the trajectories were biased towards high and low scores, indicating a distinct division in patient trajectories that was unique to this ward. In the Neurosurgery Ward, similar to the Cardiovascular Medicine Ward, the majority of patients followed the trajectory between low scores, and the proportion of patients was similar. However, trajectories in other scores were almost evenly distributed among patients, and there were patients transitioning between ultra-high scores, which was not observed in other wards. In the Cardiovascular Medicine Ward, like the Neurosurgery Ward, the most common trajectory was between low scores. However, unlike other wards, there was a higher percentage of patients transitioning from 0 to discharge, showing a bias towards trajectories between low scores and from 0 to discharge. In addition, compared to other wards, there were fewer patients transitioning between high scores and ultra-high scores.

3.2.2. Diversity of Trajectories. Using the same period and scoring classification, differences in the diversity of trajectories were compared. In Figure 7, the red trajectories represent the two most frequent paths, while the blue trajectories denote all other paths. In the Orthopaedic Surgery Ward, there were 84 trajectories out of 225 possible ones. The scores ranged from 0 to 11 points. 164 patients (24.0%) followed trajectories between low scores, 27 people (3.9%) between medium scores, and 265 people (38.7%) between high scores. No patients transitioned between ultra-high scores or from 0 to discharge. A notable 62.7% of patients were concentrated in the top two scoring layers, indicated in red. In the Neurosurgery Ward, there were 104

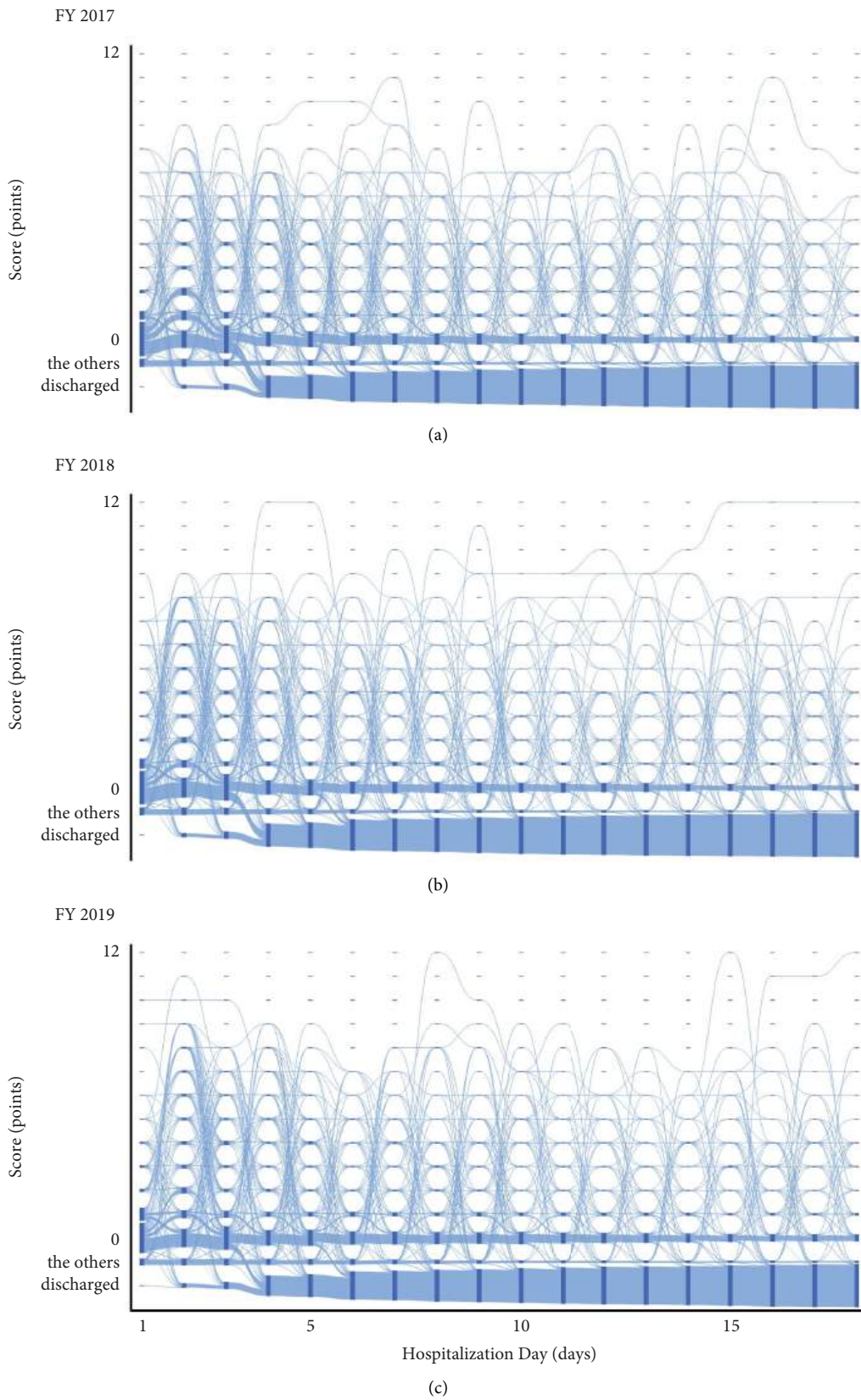


FIGURE 5: The trajectories of nursing demand in the Cardiovascular Medicine Ward for fiscal year (a) 2017, (b) 2018, and (c) 2019. Nodes are represented by rectangles indicating the score. The flows between them are depicted by curves leading from the source to the target nodes. The volume of each flow is indicated by the thickness of the curve. “The others” indicates “staying in other wards or specialized beds.”

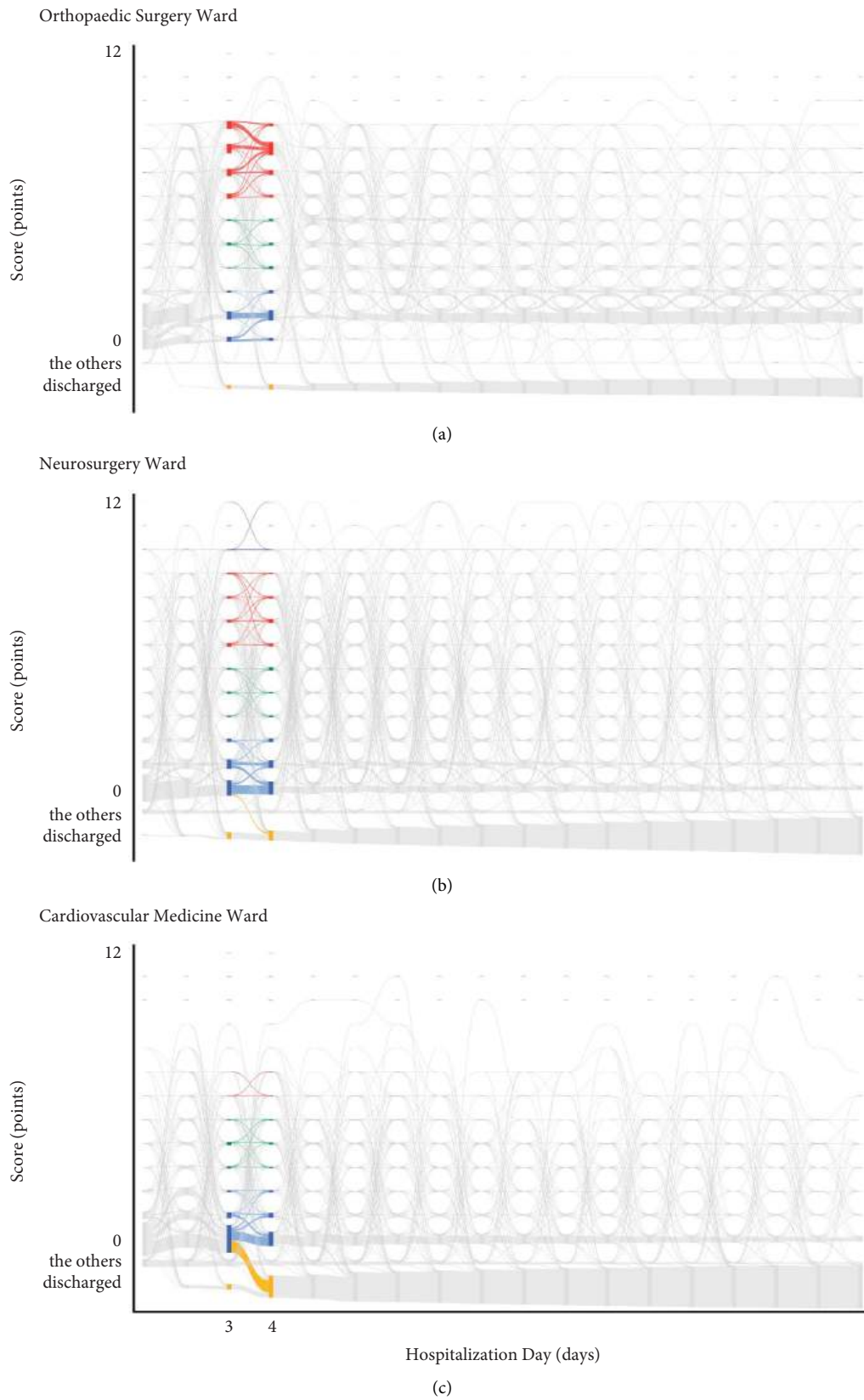


FIGURE 6: The trajectories of nursing demand classifications from day 3 to day 4 in each ward for fiscal year 2017 (a) in the Orthopaedic Surgery Ward, (b) in the Neurosurgery Ward, and (c) in the Cardiovascular Medicine Ward. The yellow trajectories indicate paths from 0 points to discharge, with blue for low scores, green for medium scores, red for high scores, and purple for ultrahigh scores. Nodes are represented by rectangles indicating the score. The flows between them are depicted by curves leading from the source to the target nodes. The volume of each flow is indicated by the thickness of the curve. “The others” indicates “staying in other wards or specialized beds.”

trajectories out of 225 possible ones, with scores ranging from 0 to 12 points. 314 people (37.4%) exhibited trajectories between low scores, 39 people (4.6%) between medium scores, 110 people (13.1%) between high scores, 8 people (1.0%) between ultra-high scores, and 22 people (2.6%) from 0 to discharge. A total of 50.5% of patients were concentrated in the top two scoring layers, shown in red. In the Cardiovascular Medicine Ward, there were 73 trajectories out of 225 possible ones, with scores ranging from 0 to 9 points. 325 people (32.7%) showed trajectories between low scores, 33 people (3.3%) between medium scores, 5 people (0.5%) between high scores, and 218 people (21.9%) from 0 to discharge. No patients transitioned between ultra-high scores. A total of 54.6% of patients were concentrated in the two highest-scoring layers, shown in red.

The Orthopaedic Surgery Ward showed a wider range of scores yet had the highest proportion of patients following notable trajectories, indicating not only a large bias towards notable trajectories but also other patients followed relatively limited trajectories. This was reflected in the diagram by thick red trajectories and a wide range of low-density blue trajectories. The Neurosurgery Ward, with a wider range of scores, had the lowest proportion of patients following notable trajectories, showing the most diverse patterns. This indicated a smaller bias towards significant trajectories, with other patients following a wide range of diverse trajectories. This was represented in the diagram by thin red trajectories and a wide range of high-density red trajectories. The Cardiovascular Medicine Ward, despite a moderate proportion of patients following notable trajectories, had the narrowest range of scores and the fewest trajectory patterns. While there were not many patients following notable trajectories, other patients were following specific trajectories within a narrow range. This was represented in the diagram by relatively thick red trajectories and a narrow range of low-density blue trajectories.

While each ward exhibited several prominent trajectories followed by a significant number of patients, we observed noticeable differences among these trajectories across the wards. Consequently, each ward exhibited unique features in the trajectory of nursing demand. As these features indicated, the trajectories of nursing demand were more similar when we compared them between fiscal years in the same wards than when we compared them between wards. Due to space constraints in this paper, we only presented results from the three wards. However, in practice, similar trends were obtained in the other 17 wards where the same indicator was used.

4. Discussion

4.1. The Statistical Regularities in Temporal Dynamics of Nursing Demand across Fiscal Years within Each Ward. The temporal dynamics of nursing demand are similar from year to year when the first day of each patient's admission is set as the starting point, and the dynamics are viewed from the perspective of the patient population. These similarities suggest the existence of statistical regularities in nursing demand. Clinically, the nursing demand with the

progression of hospitalization days in different groups of newly admitted patients may change probabilistically in the same manner.

These statistical regularities could, in part, be attributable to the decisions made regarding treatment and the support given to patients to follow the course of treatment according to their clinical pathways. In clinical practice sites, when treatment methods are determined, patients are considered to follow a certain predictable course, enabling the provision of nursing care to be aligned with the clinical pathways, excluding patients with multiple comorbidities, dementia, or advanced age. In addition, patients managed with clinical pathways exhibit higher protocol adherence and lower incidence of complications than those without clinical pathways [31, 32]. Thus, the decisions made regarding treatment and the implementation of the clinical pathways could potentially contribute to the similar nursing demand among the patient population in each ward.

The statistical regularities in nursing demand are also considered to be attributable to the biological healing process following a specific course. This is because, despite the clinical pathway compliance rate in the target hospital being less than 50%, more than half of the inpatients appeared to follow a similar trend. When a living body undergoes an invasive treatment, including surgical intervention, it triggers a stress response, striving to maintain homeostasis [33]. Furthermore, postintervention, the body recovers by passing through stages of "injury," "the turning point," "muscular strength," and "fat gain" [34]. Thus, the somewhat rule-based recovery process of a body following an invasive procedure could contribute to the regularities observed in temporal dynamics of nursing demand.

The existence of statistical regularities potentially indicates that we may be able to probabilistically forecast the temporal variation of nursing demand among patients in future years by utilizing historical data on nursing demand. That is because patterns of temporal dynamics of nursing demand are not coincidental but inherent characteristics of the respective wards, and the same phenomena could potentially occur every year. In essence, by creating a system that predicts temporal variations based on past nursing demand data, we may be able to forecast individual patients' temporal changes in nursing demand when this system is applied to future data.

Predicting nursing demand based on statistical regularities will enable the simulation of efficient staff allocation by determining which patients should be assigned to which nurses, ultimately ensuring patient safety with fewer nurses. Although, some prior studies have estimated the number of nurses needed for patient populations, there is a lack of evidence regarding the assignment of individual nurses to individual patients. The nursing shortage was reported to be resolved by securing a sufficient baseline number of full-time nurses and addressing any deficiencies with the addition of temporary staff [35]. However, increasing the number of nurses becomes progressively more difficult due to the looming nursing shortage. Even with additional temporary nurses, a lack of coordination among staff may leave the care undone, threatening patient safety [36]. Thus, we should

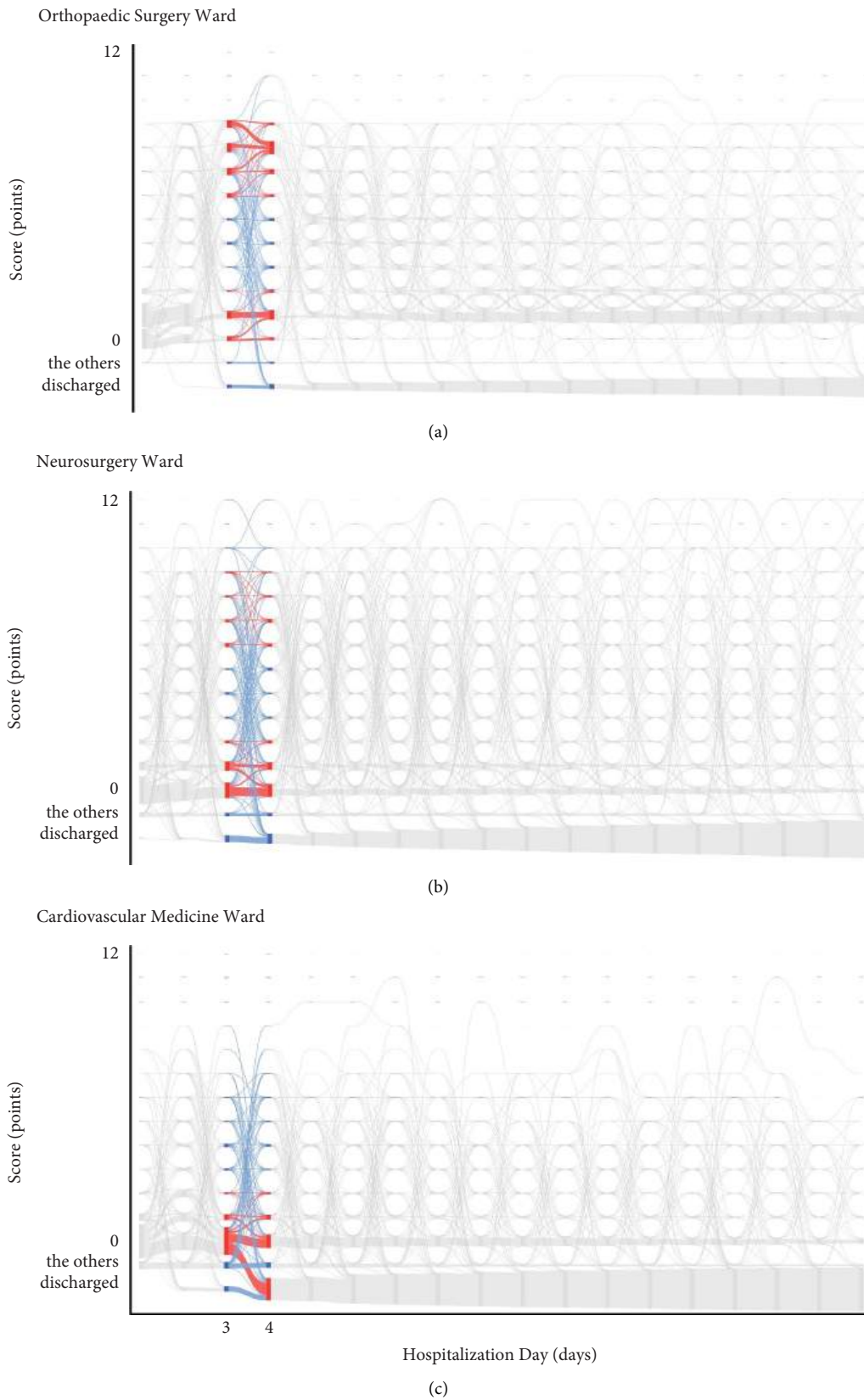


FIGURE 7: The diversity of nursing demand trajectories from day 3 to day 4 in each ward for fiscal year 2017 (a) in the Orthopaedic Surgery Ward, (b) in the Neurosurgery Ward, and (c) in the Cardiovascular Medicine Ward. The red trajectories represent the two most frequent paths, while the blue trajectories denote all other paths. The flows between them are depicted by curves leading from the source to the target nodes. The volume of each flow is indicated by the thickness of the curve. “The others” indicates “staying in other wards or specialized beds.”

assign the limited full-time nursing resources available to patients more efficiently. The inherent statistical regularities in nursing demand can predict changes in nursing demand and inform a simulation model. This model can calculate optimal solutions for assigning nurses to patients [37], thus facilitating the determination of efficient nurse assignments to meet the daily changing needs of individual patients. However, it should be noted that this application assumes equality in nurses' factors. When assigning individual nurses to individual patients, we must consider the nurses' abilities [38] and their perceived workload [39]. To apply these regularities to a staffing model, further examination of additional factors is necessary.

Our use of extensive data represents one of the significant strengths of this study. This allowed us to identify the full range of trajectories in the target wards and to investigate potential statistical regularities. In addition, our analysis was not affected by seasonality since we did not focus on a specific short-term period. Analysis of all patients admitted to the target wards of the target hospital over a three-year period, excluding those with missing data, greatly facilitated our ability to attain these results.

We observed a certain number of patients experiencing a sudden surge in scores or consistently transitioning with high scores each year, especially in the Orthopaedic Surgery Ward and the Cardiovascular Medicine Ward. This suggests that there are also statistical regularities among a small number of patients within the population. These patients had been likely to develop complications or exacerbate comorbidities. That is because, while the proportions vary, some patients have experienced variances in their clinical pathways [40, 41]. In addition, the occurrence of post-operative complications has been associated with an increase in nursing workload, that is, the increase in nursing demand [42]. Thus, the occurrence of complications is considered to result in increases in nursing demand. However, it remains unclear whether there is any regularity in the timing of these occurrences or the scores assigned to them. Future research should aim to elucidate these uncertainties and investigate the features of temporal changes in abnormal patients. This is crucial because, despite the challenges in forecasting sudden changes and abnormal recovery processes from an individual perspective, such occurrences necessitate a substantial amount of nursing care, which can place a significant burden on nurses [42]. To provide necessary care to these patients, as well as the broader patient population, it is essential to adjust nursing schedules and devote nursing resources. The ability to forecast patients with a rapid increase in nursing demand is thought to facilitate efficient, effective, and flexible nursing staff scheduling. In order to adequately devote nursing resources to address the occurrence of abnormal patients, it is necessary to investigate the statistical regularities in their temporal changes.

In the Neurosurgery Ward, it was not possible to clearly discern patients who were considered to experience complications and therefore to undergo a rapid change in nursing demand. The reason is that the patient population in this ward exhibited a greater variety of nursing demand change patterns compared to the other two wards. Each

patient followed various trajectories, meaning that the proportion of patients following each trajectory is low, or in other words, the "flow" is "thin." Consequently, the trajectories of such a small number of patients may have been masked.

4.2. The Ward-Specific Feature of the Statistical Regularities in Temporal Dynamics of Nursing Demand. The statistical regularity inherent in the trajectories of nursing demand is evidently ward-specific. This may be attributed to the different types or levels of nursing care required in different wards, as diverse diseases and treatments impair varying functions in patients [43, 44]. For instance, in the Orthopaedic Surgery Ward, nurses often need to provide considerable assistance to mobilize patients due to their physical dysfunction. A significant amount of care is especially needed just after surgery, and the level of care typically decreases as the days of hospitalization progress. Conversely, in the Neurosurgery Ward, they must manage risk behaviors caused by patients' cognitive dysfunction. The causes of cognitive impairments, such as delirium, often occur suddenly. Moreover, in the Cardiovascular Medicine Ward, nurses often offer various types of care related to ADL since patients often struggle to perform these tasks independently due to circulatory instability or fatigue throughout their hospital stay. Consequently, it is plausible that the specific nature of diseases and treatments gives rise to ward-specific regularities in the temporal dynamics of nursing demand. However, we did not identify the differences in diseases and treatments among participants. Therefore, the detailed causes of these variations in dynamics are speculative at best. Future research needs to pinpoint the factors contributing to the statistical regularities in temporal dynamics, as the amount and timing of nursing care needed to meet the demands of the patient population are likely dependent on its components.

It is essential to forecast the temporal changes in nursing demand on a ward-by-ward basis for nursing management. Indeed, wards serve as the fundamental units of nursing management, with nursing staff scheduling and bed management often implemented at this level. The ward-specific statistical regularities can offer valuable insights for managing nursing in practical settings.

The ward-specific statistical regularities can extend beyond utilization within the ward itself, potentially applying to staff allocations from the hospital to individual wards. By predicting and aggregating nursing demand for each ward, it is possible to estimate the range of basic nursing volume required by patient populations in each ward [45]. The estimated overall nursing demand can lead to estimations of the fundamental number of nurses needed for each ward [45, 46]. Furthermore, wards experiencing significant fluctuations in overall nursing demand may require more flexible staff allocations. Aggregation by ward can also inform the examination of the ratio between fixed and temporary staff numbers. This approach serves as one process in determining the number of nurse staff to be allocated from the hospital to each ward, representing the utilization of nursing management from a more macroperspective than

daily assignments. As previously mentioned, this application assumes equality in nurses' factors, such as abilities and perceived workload. Further research is necessary to identify the factors that should be considered in developing a staffing model.

Since various factors influence the nature of nursing demand [37], charge nurses and nurse managers, who focus more on administrative and managerial duties, have to devote daily nursing resources and permanent nurses based on the nursing demand forecasted from various perspectives. This study represents one such perspective necessary for forecasting nursing demand. Our findings are expected to contribute to forecasting nursing demand and estimating nursing resources, leading to data-driven, more efficient nursing management.

5. Conclusions

The main finding of this study is that the temporal changes in nursing demand demonstrate greater similarity when compared across fiscal years within individual wards than when compared between different wards. This observation suggests the existence of statistical regularity in the temporal changes in nursing demand within each ward. Furthermore, it implies that the temporal changes in nursing demand exhibit unique statistical regularities in each different ward.

As demonstrated in this paper, the statistical regularity is intuitively identified by viewing the temporal changes in nursing demand within each ward as an overlay of multiple trajectories. In addition, we were able to distill statistical regularities across multiple fiscal years by harnessing a substantial amount of data, by encapsulating the influence of individual patients within these regularities.

These findings suggest that patients admitted to the wards are considered to exhibit a certain probabilistic change in nursing demand. It can be inferred that the temporal changes in nursing demand of the patient population are potentially predicted probabilistically, which is useful for nursing management.

6. Limitation

This study has four limitations.

First, the inherent statistical regularities presuppose that the medical and nursing systems have not undergone significant changes over the fiscal years. In fact, a period of three years without such changes was selected for analysis. Specifically, data were extracted from a period without significant ward reorganization due to the COVID-19 pandemic. Changes in hospital operations, such as altering the patient-to-nurse ratio or patient characteristics, may result in a failure to recognize the statistical regularities in nursing demand. Consequently, additional Sankey diagrams may be required to identify new statistical regularities. After the nature of the patterns has changed, within a period where the situation remains unchanged, it will be possible to determine certain regularities, as mentioned in this study.

Second, although the data were thoroughly utilized for the management of the target hospital, the results may lack

generalizability as they were collected from a single acute hospital. The results may not be directly applicable to hospitals or facilities of different sizes or service offerings, particularly smaller healthcare facilities or those specializing in specific medical services. To address this, it would be beneficial to analyze data from patient populations admitted to each hospital in a similar manner. For example, a secondary analysis of data independently recorded at each hospital or facility can identify patterns of nursing demand inherent in the patient populations of those facilities.

Third, the score for item "B" in the INCN only quantifies certain aspects of nursing demand related to ADL and cognition. As such, it may not encapsulate the entirety of nursing demand. However, a statistical regularity is presumed to exist in the temporal dynamics of nursing demand when using this particular indicator.

Last, the score for item "B" in the INCN might not fully represent all nursing demands related to ADL and cognition encapsulated within item "B." This is because these scores are determined based on the actual provision of nursing care. In situations where patients require nursing care from a professional nursing perspective, but such care is not provided, no points are added to the score. Therefore, if the score truly represented nursing demand, the similarity of temporal dynamics between fiscal years might decrease.

7. Implications for Nursing Management

In this study, we identified ward-specific statistical regularities in the temporal dynamics of nursing demand. The existence of such regularities suggests the possibility of forecasting changes in nursing demand and strategizing accordingly [47]. Specifically, we could potentially forecast temporal changes in nursing demand by utilizing data from past fiscal years. This would enable charge nurses and nurse managers to staff efficiently from two main perspectives. First, on a ward-by-ward basis, charge nurses can assign individual nurses to patients daily more efficiently based on data. For example, an experienced nurse might be assigned to a patient for whom dynamic demand changes are expected; conversely, an inexperienced nurse might be assigned to a patient for whom few demand changes are expected. Charge nurses could assign available fixed nurses to patients to ensure patient safety even in situations where the nursing shortage makes it difficult to secure adequate staffing [36]. Second, in management from the hospital to each ward, by predicting and aggregating nursing demand for each ward, nurse managers can estimate the range of basic nursing volume required by the patient population [45]. They can adjust the ratio between fixed and temporary staff to meet these needs effectively. For instance, they should assign more fixed nurses in wards with small fluctuations in nursing demand and, conversely, more temporary nurses in wards with large fluctuations in nursing demand. Ward-specific patterns could also be utilized for hospital-wide management.

In various countries, it is possible to analyze data using the nursing demand indicators relevant to each nation. For instance, various countries employ the NAS to measure

direct and indirect nursing activities [10]. In Finland, the OPC instrument is used to assess the quantity and level of nursing care provided to individual patients [11, 12]. We anticipate that the identification of statistical regularities in nursing demand, as demonstrated in this study, will contribute to more efficient nursing management in various countries.

We strongly advocate for charge nurses and nurse managers to leverage the secondary analysis of extensive data. In the field of nursing practice, a variety of indicators are preserved as large volumes of data and used for different purposes. However, they are primarily employed only within the scope of their original intent. More meticulous management is necessary to ensure the adequate provision of various types and levels of nursing care, avoiding overworking nurses or straining hospital finances, especially in anticipation of future nursing resource shortages [5]. Nursing management is often executed based on assumptions and intuition derived from experienced experts such as chief nurses. However, it is crucial to base forecasts of nursing demand and estimations of necessary nursing resources on data analysis. Relying solely on expert insight could result in a decline in management quality in their absence. Given the aging and declining nursing population, concerns arise about potential future shortages of such experts. Data-driven forecasts and estimations allow nurses of all levels of experience to implement nursing management strategies with the same efficacy, regardless of their individual expertise. Future research should explore the combination of various existing data to implement data-driven nursing management, contributing to the development of nursing sciences.

Data Availability

The access data used to support the findings of this study have not been made available to protect personal information.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the publication of this paper.

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Research Article

What Influences Patients Readiness for Discharge: The Case of Total Knee Arthroplasty: A Cross-Sectional Study

Na Li,¹ Paulo Moreira ,^{2,3,4} Manjie Guo,⁵ Simeng You,⁵ Brayal Dsouza,^{6,7} and Hong Ji ^{1,5}

¹Nursing Department, The First Affiliated Hospital of Shandong First Medical University & Shandong Provincial Qianfoshan Hospital, Jinan, Shandong, China

²Henan Normal University, School of Social Affairs, Xinxiang, Henan, China

³Atlantica Instituto Universitario, Healthcare Management, Oeiras, Portugal

⁴International Healthcare Management Research and Development Center (IHM-RDC),

The First Affiliated Hospital of Shandong First Medical University & Shandong Provincial Qianfoshan Hospital, Jinan, Shandong, China

⁵School of Nursing and Rehabilitation, Shandong University, Jinan, Shandong, China

⁶Department of Social and Health Innovation, Prasanna School Of Public Health, Manipal Academy of Higher Education, Manipal, India

⁷Kasturba Hospital, Manipal, India

Correspondence should be addressed to Paulo Moreira; jpm2030@outlook.com and Hong Ji; honghongji-2005@163.com

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Aims and Objectives. To identify and explore assess factors that influence patients' readiness for hospital discharge (RHD) after total knee arthroplasty (TKA). **Background.** Evidence has suggested that most clinical staff use clinical laboratory indicators to determine discharge times, while paying little attention to patients' feelings and needs. Additional research findings have suggested a relationship between patients' self-reported readiness for hospital discharge and postdischarge complication rates, readmission rates, mortality, as well as quality of life. RHD is strongly associated with patient health outcomes. Identifying relevant influencing factors can provide guidance for early individualized interventions by healthcare professionals. **Design.** A cross-sectional study. **Methods.** During 2022, a total of 320 post-TKA patients were selected for this study. The patients were divided into the low-RHD group (<7 points) and the high-RHD group (≥7 points) according to the mean score of the Readiness for Hospital Discharge Scale (RHDS). Established scales were used to collect patients' information and to adopt univariate and binary logistic regression analysis to screen for independent factors. **Results.** In this study, the RHDS score of patients after TKA is 91.90 ± 7.05 , of which 12.8% are in the low-RHD group (mean score <7). The binary logistic regression results reveal that age, educational level, postactivity pain, self-efficacy, and family care have to be considered risk factors generating low-RHD in TKA patients. **Conclusions.** The present study suggests that over 1/8 TKA patients are not ready at the time of discharge. Physicians and nurses can improve patients' RHD by reducing postactivity pain and improving self-efficacy during their rehabilitation period. **Relevance to Clinical Practice.** The results of this study can help physicians and nurses early identify high-risk patients with low RHD and provide them with individualized interventions. In addition to this, it is important that nurses use RHDS to assess the readiness of TKA patients before they are discharged from the hospital.

1. Introduction

As the aging and obese population increases, the number of total knee arthroplasty (TKA) shows a yearly upward trend [1–3]. The annual number of TKA in China has also grown rapidly from 50,000 cases a decade ago to nearly 400,000

cases, with a growth rate of about 27.43% per year, and the number is still rising [4]. It is expected that TKA will become one of the most common surgical operations in the next decade [5].

In response to the healthcare management challenges from increasing number of TKA, hospitals are taking

measures to reduce the length of stay of patients [6–8]. However, the TKA patients usually require 3–6 months support for functional exercise [9]. Thus, as shorter hospital stays reduce the amount of time available to prepare patients for discharge, the risk that their readiness may be affected may increase. In addition to this healthcare management challenge, evidence has suggested that most clinical staff use clinical laboratory indicators to determine discharge times, while paying little attention to patients' feelings [10, 11]. Hence, additional research findings have suggested a relationship between patients' self-reported readiness for hospital discharge and postdischarge complication rates, readmission rates, mortality, as well as quality of life [12–14]. Already in 2017, evidence identified readiness for hospital discharge (RHD) as one of the key indicators of patient safety discharge, which include physical stability, adequate support, psychological ability, and adequate information and knowledge [15]. Identifying the current status and factors that affect RHD in patients after TKA can support physicians and nurses to improve and implement early, individualized interventions with positive impacts on the quality of health care. The literature review undertaken exposed the scarcity of studies on RHD in patients with TKA. Also, as people with different diseases tend to register different RHDS scores and different influencing factors [16], looking into the specificity of TKA patients is justified. In this sense, the main objective of this study is to investigate the current status of RHD in TKA patients and to identify influencing factors. The evidence generated in this article aims to provide guidance for physicians and nurses to improve the readiness to hospital discharge in TKA patients.

1.1. Theoretical Framework. Meleis introduced the concept of transition into nursing in the 1960s, developing the transition theory. Transformation theory mainly comprises the following 4 core notions: the transformed nature, the transformed conditions, the reaction mode, and the care therapy [17]. Based on this, we explore the transformed nature (BMI, type of surgery, etc.), the transformed conditions (age, gender, self-efficacy, etc.), and nursing therapy (discharge teaching) on the reaction mode (the RHD of post-TKA patients) (more details in Figure 1).

2. Methods

2.1. Study Design and Setting. This is a cross-sectional study. From January to May 2022, post-TKA patients from orthopedic departments are conveniently selected for this study in three third-grade A hospitals in Jinan, Shandong Province. In regression analysis, one should have a sample size of 5–10 times the independent variables. There are 25 independent variables involved in this study, and considering 10% ineffective questionnaires, thus requiring at least 275 patients.

2.2. Participants. Three hundred and twenty patients after TKA are recruited for this study. Participants are included according to the following criteria: (a) patients after TKA;

(b) from Shandong Province; (c) good at communicating with others; and (d) willingly join the research and give written consent. Participants are excluded according to the following criteria: (a) with a history of mental illness and (b) develop complications after surgery such as deep vein thrombosis and infection.

2.3. Data Collection. The collection of data is carried out by two graduate students, and both of them have completed 6 months of internship in the Orthopedic Department. The survey is conducted on the day of the patient's discharge, in a quiet room, and takes approximately 20 minutes per patient. Considering that some of the participants are older and have a lower educated level, this research uses a one-on-one question-and-answer format. That is, the graduate student asks the patients about the questionnaire entries and then presents their answers objectively on the questionnaire.

2.4. Instruments. Based on Galvin et al.'s conceptual analysis of RHD, physical (disease-related information), support (social support and family care), psychological ability (self-efficacy), and knowledge (pain control knowledge) are factors that influence a patient's RHD. In addition to this, the scales used in this study are also chosen according to Meleis' transition theory. In summary, we have used the following questionnaires and scales to assess data relating to patients after TKA.

2.4.1. General Information Questionnaire. It is developed by members of the group based on a review of the literature and consultation with clinicians, including demographic information and disease-related information.

2.4.2. Readiness for Hospital Discharge Scale (RHDS). The RHDS was developed by Weiss and Piacentine [18] based on Meleis' transition theory. We use a Chinese version of Lin et al. [19] for this study. The scale consists of 12 questions, each scored 0–10. A mean score of entries on the scale will be used to determine a patient's RHD, with a score of <7 indicating low RHD and ≥ 7 indicating high RHD [20]. There are 3 dimensions in total, which are "Personal Status," "Adaptive Capacity," and "Expected Support." The Cronbach's alpha coefficients for the overall and three dimensions are 0.883, 0.821, 0.851, and 0.778, respectively. The validated Chinese version of the Readiness for Hospital Discharge Scale (RHDS) has been used in previous studies [11, 21]. In addition, there was a pretest. This study used 30 patients in a presurvey, and the results showed that they could understand and answer the questionnaire well.

2.4.3. Visual Analogue Scale (VAS). The VAS is a widely used pain measurement tool to assess the intensity of a patient's pain currently or over 24 hours [22]. It is a 10-cm long straight line with a score ranging from 0 to 10, of which a higher score indicates stronger pain [23]. In this study, it is used to assess the postactivity pain in TKA patients. The

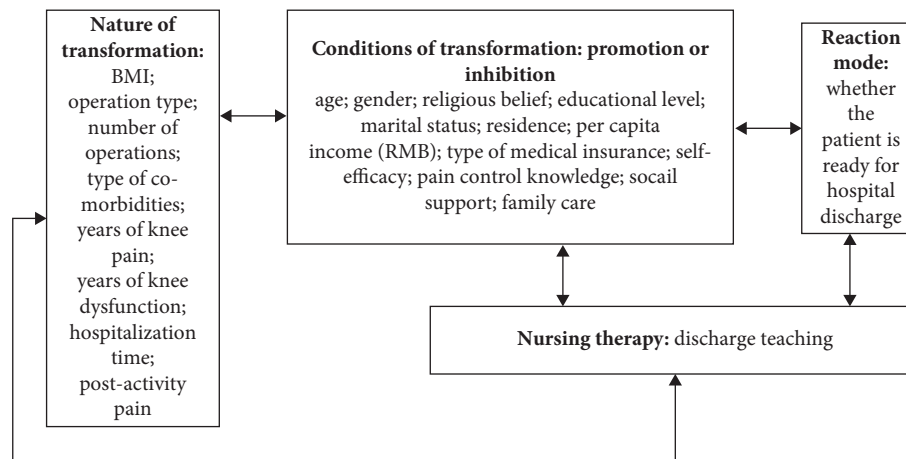


FIGURE 1: The theoretical framework of the research. Note: BMI = body mass index.

Chinese version of this scale has been widely used in studies [24, 25].

2.4.4. Quality of Discharge Teaching Scale (QDTS). The QDTS is developed by Weiss et al. [26] to measure the quality of discharge teaching as perceived by patients, which includes three dimensions, a total of 24 questions with 0–10 points each. Higher scale scores indicate better quality of discharge teaching for patients. The overall Cronbach's alpha coefficient is 0.863. The pretest of the Chinese-translated version was undertaken by many researchers [27, 28].

2.4.5. Self-Efficacy for Rehabilitation Outcome Scale (SER). The SER is developed by Waldrop et al. [29], which includes 12 questions of 0–10 marks each. The scale has been Sinicized and extensively adopted among the Chinese populace [30]. This study uses a total SER score to assess the beliefs of TKA patients in applying adaptive behavior during the rehabilitation period, with higher scores associated with greater self-confidence. The overall Cronbach's alpha coefficient is 0.908.

2.4.6. Pain Control Knowledge Questionnaire. The Pain Control Knowledge Questionnaire, developed by Wen Mei, Sichuan University, China, in 2007 [31], included 8 questions of 1–5 marks each. The researcher has obtained access to the scale via Email. The higher the score, the greater the patient's knowledge of pain control.

2.4.7. Social Support Rating Scale (SSRS). We use the SSRS developed by Xiao [32] to assess the current status of patients' social support. This scale has 10 items with a score range of 12–66, and the higher the total score, the better the social support. The overall Cronbach's alpha coefficient is 0.720.

2.4.8. Family APGAR Scale. The scale, designed by Smilkstein, consists of 5 items, each with a score of 0–2 [33], which

has been used in knee disease patients and has good reliability and validity [34]. In this study, we use the total score of the scale to assess the patient's subjective satisfaction with family functioning. The pretest of the Chinese-translated version was undertaken in a variety of populations [35, 36].

2.5. Data Analysis. We use SPSS (version 26.0) for statistical description and statistical analysis. Numbers and percentages are used to describe demographic information and disease-related information. Continuous variables are described by the mean \pm standard deviation (SD) if they conform to a normal distribution, and if not, by the median and interquartile range. An independent samples *t*-test, chi-square test, and Fisher's exact test are used to compare the differences between the two groups. A binary logistic regression is used to explore the factors affecting post-TKA patients' RHD, with the model applying a forward stepwise likelihood ratio. The significance level of the hypothesis test is set at $\alpha = 0.05$ (two sides).

Before the binary logistic analysis, a covariance diagnosis was carried out using SPSS 26.0 software, which showed that the variance inflation factor (VIF) values ranged from 1.114 to 3.391. In addition, the aim of this study is to investigate the several factors that influence the readiness of post-TKA patients for discharge rather than to analyse the effect of a particular variable on their RHD.

2.6. Ethical Considerations. This study has received approval from the Ethics Committee of the School of Nursing and Rehabilitation, Shandong University (2022-R-021). Before the study begins, the investigators obtained informed consent from the patients and assure them of the confidentiality of the study data.

3. Results

In this study, we collect effective data from 320 patients, with 41 (12.8%) patients with a mean score of less than 7 on the RHDS. The age of the patients ranges from 50 to 88 years, and the mean age is 66.49 years (SD: 7.02). More than three

quarters of them are women. The majority of patients are nonreligious (93.4%), married (80.6%), overweight or obese (80%), and with comorbidities (74.1%). Over 85% of the patients have their first TKA and have a unilateral replacement. The results of the univariate analysis shows that age, education level, marital status, per capita income, number of comorbidities, hospitalization time, postactivity pain, quality of discharge teaching, self-efficacy, pain control knowledge, social support, and family care are independent factors for RHD in patients with TKA ($P < 0.05$), more details in Table 1.

The patients' scores for total RHDS and scores for each dimension are shown in Table 2. First, we diagnose that there is no multicollinearity between variables which are statistically significant for univariate analysis and then perform a binary logistic regression analysis (forward: LR method). The results show that age, postactivity pain, education level, self-efficacy, and family care are independent factors, more details in Table 3. The Hosmer–Lemeshow goodness-of-fit test suggests that the overall model fit is adequate ($\chi^2 = 2.736$, $P = 0.950$). At the same time, the Nagelkerke R^2 reveal that the logistic regression model explains 69.0% of the variance.

The average length of stay for post-TKA patients was 5–7 days in the three hospitals.

4. Discussion

The results of this study show that the mean RHDS score of patients after TKA is (7.66 ± 0.59), an intermediate level. In this research, TKA patients have lower RHD than those medical and surgical patients who had a mean RHDS score of (8.62 ± 1.47) [37]. An analysis of the reasons for this may be as follows: on the one hand, as an invasive procedure, post-TKA patients often have pain and functional limitations [38]. Also, even up to 1/5 of the patients suffer from a fear of movement and a severe reduction in mobility [39], which affects their functional recovery. On the other hand, compared to other surgical operations, like hip arthroplasty, TKA patients require long-term rehabilitation at home [40], which may increase their discharge uncertainty and decrease their RHD. Of the three dimensions of RHDS, adaptive capacity has the lowest score and expected support has the highest score, a fact that is exactly the opposite of what is found in earlier studies [13]. The reason for this result may be connected to the traditional Chinese culture where family members take the initiative to provide patients with living support, encouragement, and favorable conditions for functional exercise. The results of Wang et al.'s study of cancer survivors indicate that Chinese collectivist-oriented culture promotes social harmony and makes it easier for patients to express their inner feelings and thus receive support [41]. On the contrary, low scores on adaptive capacity indicate that patients lack confidence in their ability to recover at home and care for themselves after surgery.

The results of binary logistic regression in this research suggest that the older the age, the worse the patient's RHD (OR = 1.187), which is consistent with previous studies [42]. Older patients are more likely to have poorer health and

more comorbidities, which could lead to difficulties in restoring their quadriceps strength and prolong recovery time. So, they are more likely to have a low RHD at the time of discharge. This suggests that doctors and nurses should pay more attention to older patients, formulate comprehensive rehabilitation plans through multidisciplinary consultation, and clarify their disease character. In addition to this, doctors and nurses should improve the patient's physical condition through nutrition, medication, and rehabilitative exercises before surgery, thus improving their RHD.

Postactivity pain is a risk factor for low RHD in patients (OR = 2.461). Postactivity pain is an important problem for TKA patients [43, 44]; about 60% of them experience pain after surgery [45]. Pain can trigger a systemic stress response in the patient, affecting the body's autonomy and immune system, causing a range of postoperative conditions and seriously affecting postoperative rehabilitation [46]. Consequently, physicians and nurses should pay more attention to patients' pain problems and actively adopt various methods such as multimode analgesia [47], a cold compress [48], as well as traditional Chinese medicine treatment [49] to alleviate postoperative pain so that patients can be ready for discharge soon.

Patients with high levels of education are more likely to have high RHD after TKA (OR = 0.093), which is in agreement with several previous studies [50, 51]. First, patients with a high educational level can better understand the content of discharge teaching and make full use of health information resources and second, they can effectively communicate with medical staff and get helpful information. So, nurses should focus on those patients whose education level is an elementary school and below and use easy-to-understand language for discharge teaching, avoiding medical jargon. At the same time, a good relationship should be established between the doctor and the patient so that the patients can truly express their inner needs to the doctors and nurses.

Different from previous findings, self-efficacy is a significant factor that affected patients' RHD in the present research (OR = 0.836), rather than the quality of discharge teaching [11, 21, 52]. Self-efficacy, as a cognitive mechanism regulating behavioral activities in the field of rehabilitation, can facilitate the translation of patients' motivation and willingness to engage in activities into the performance of specific activity behaviors [53]. The postoperative rehabilitation for TKA patients will directly affect the outcome of the surgery and is crucial to their ability to gain independent [54, 55]. Therefore, healthcare professionals could construct rehabilitation programs based on Bandura's self-efficacy theory to increase patients' self-efficacy levels and enhance their confidence in overcoming their illness, thereby improving their RHD.

Family care is also an important factor in RHD for people with TKA (OR = 0.344), not social support as in previous findings [13, 56]. Influenced by the traditional Chinese culture of "filial piety," children will play a supportive role in their parents' later years. Due to the trauma of the surgery, patients undergo physical and psychological changes after TKA, as well as increased dependency. To this

TABLE 1: Univariate analysis of RHD in TKA patients ($N = 320$).

Variables	Total ($n = 320$)	Low RHD ($n = 41$)	High RHD ($n = 279$)	$t/F/\chi^2$	P
Age (years) ^a	66.49 ± 7.02	72.32 ± 5.47	65.63 ± 6.81	-6.000	<0.001
Educational level, n (%)					
Elementary school and below	139 (43.4)	35 (85.4)	104 (37.3)	33.647	<0.001
Junior high school and above	181 (56.6)	6 (14.6)	175 (62.7)		
Marital status, n (%)					
Married	258 (80.6)	25 (61.0)	233 (83.5)	11.623	0.001
Divorced or widowed	62 (19.4)	16 (39.0)	46 (16.5)		
Per capita income (RMB), n (%)					
<2000	165 (51.6)	30 (73.2)	135 (48.4)	8.791	0.003
≥2000	155 (48.4)	11 (26.8)	144 (51.6)		
Number of comorbidities, n (%)					
0	83 (25.9)	3 (7.3)	80 (28.7)	13.859	0.001
1~2	214 (66.9)	31 (75.6)	183 (65.6)		
≥3	23 (7.2)	7 (17.1)	16 (5.7)		
Hospitalization time (days) ^a	5.83 ± 1.45	6.37 ± 1.73	5.75 ± 1.39	-2.546	0.011
Postactivity pain (points) ^a	3.93 ± 1.39	5.34 ± 0.99	3.72 ± 1.32	-9.335	<0.001
Quality of discharge teaching (points) ^a	143.34 ± 7.43	138.73 ± 10.22	144.02 ± 6.69	3.216	0.002
Self-efficacy (points) ^a	80.68 ± 6.03	72.63 ± 7.23	81.86 ± 4.83	7.918	<0.001
Pain control knowledge (points) ^a	26.77 ± 4.90	24.80 ± 4.88	27.05 ± 4.84	2.773	0.006
Social support (points) ^a	39.55 ± 5.92	34.78 ± 5.30	40.25 ± 5.68	5.807	<0.001
Family care (points) ^a	6.98 ± 1.06	5.93 ± 0.65	7.13 ± 1.02	10.201	<0.001

Note. ^a: mean ± Standard deviation.

TABLE 2: RHDS score for TKA patients ($N = 320$).

Dimension	Number of entries	Score range	Actual score	Average score
Personal status	3	0~30	23.48 ± 2.32	7.83 ± 0.77
Adaptive capacity	5	0~50	36.78 ± 3.72	7.36 ± 0.74
Expected support	4	0~40	31.63 ± 2.51	7.91 ± 0.63
Readiness for hospital discharge	12	0~120	91.90 ± 7.05	7.66 ± 0.59

TABLE 3: Binary logistic regression analysis of RHD in patients with TKA ($N = 320$).

Variables	B	$Wald$	P	OR	95% CI
Ages	0.172	10.686	0.001	1.187	[1.071, 1.316]
Postactivity pain	0.901	10.297	0.001	2.461	[1.420, 4.265]
Educational level	-2.375	10.242	0.001	0.093	[0.022, 0.398]
Self-efficacy	-0.179	14.879	<0.001	0.836	[0.763, 0.916]
Family care	-1.068	8.074	0.004	0.344	[0.165, 0.718]
Constant	5.752	1.090	0.296	314.97	

Note. Omnibus test of model coefficients. $\chi^2 = 147.461$, $P < 0.001$; Pseudo-(Nagelkerke) $R^2 = 0.690$; Hosmer-Lemeshow. $\chi^2 = 2.736$, $P = 0.950$. CI, confidence interval; OR, odds ratio.

end, the nurse should urge the families to give more care and support to the patients. A good family functioning is effective in reducing postoperative stress and strain, increasing the patient's level of hope, speeding up their recovery process and improving RHD. Thus, healthcare professionals can involve family members in the patient's discharge planning and teach them care skills. Moreover, family members can play a supervisory role in the patient's recovery process.

As the evidence generated in this article aimed to provide guidance for physicians and nurses to improve the readiness

for hospital discharge in TKA patients, the following are key recommendations for professionals around the world: First of all, physicians and nurses need to pay attention to patients' RHD and include their self-reported RHD as part of the discharge assessment plan. Then, the hospital should form a multidisciplinary discharge service team consisting of orthopedic specialists, anesthetists, dieticians, rehabilitators, and nurses so as to develop a personalized discharge plan for the patient based on their actual situation. Next, the hospital units could improve the quality of discharge teaching for patients by regularly organizing post-TKA nursing knowledge competitions, nursing skills competitions, teaching competitions, etc. It is also important to include patients' families in discharge teaching. Last but not the least, there should be timely and excellent communication between the higher hospital and the community sector regarding the patient's condition and recovery. Through mobile web-based devices, senior doctors can regularly guide community doctors in assessing patients' recovery to reduce their uncertainty after discharge from hospital.

4.1. Limitation. This research still has some limitations. First, the subjects of this study are all from Jinan, Shandong Province, with limited extrapolation of results. Second, this

study uses a one-on-one question-and-answer format to collect patient data, which may have some reporting bias. In the future, we could carry out multicenter studies to further explore the factors influencing RHD in patients after TKA.

5. Conclusions

The RHD of TKA patients is first brought to our attention. The results of this study shows that TKA patients have a moderate level of RHD and over 1/8 of the patients are not prepared at discharge. In particular, age, postactivity pain, education level, self-efficacy, and family care are factors influencing RHD in patients with TKA.

6. Implications for Practice

First, the results of this study provide a basis for clinical staff to identify high-risk patients with low RHD and provide them with individualized interventions. Second, it is important that nurses use RHDS to assess the readiness of TKA patients before they are discharged from the hospital. Third, hospital managers should adhere to a “patient-centered” management model and develop personalized discharge services for patients from the start of their visit. Finally, hospitals should work with the community to assign post-discharge rehabilitation plans for patients in the context of their condition in order to reduce their uncertainty after discharge and improve their RHD [57–60].

Data Availability

The data used to support the findings of this study are available from the corresponding authors upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Na Li and Paulo Moreira are equivalent first authors.

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Research Article

“Negative Energy Magnetic Field”: A Descriptive Qualitative Study on Occupational Stressors among Chinese Hospice Nurses

Yanming Wu ¹, Ya Mao ¹, Yangchenchen Liu ², Erming Yang ¹, Yuxin Zhou ³,
Yuanyuan Jin ⁴, and Hui Yang ^{1,5}

¹Nursing College of Shanxi Medical University, Taiyuan, Shanxi, China

²Department of Psychology, University of Minnesota, Minneapolis, MN, USA

³Cicely Saunders Institute of Palliative Care, Policy and Rehabilitation,
Florence Nightingale Faculty of Nursing Midwifery & Palliative Care, King's College London, London, UK

⁴School of Nursing, Medical College of Soochow University, Suzhou, Jiangsu, China

⁵First Hospital of Shanxi Medical University, Taiyuan, Shanxi, China

Correspondence should be addressed to Yuanyuan Jin; yyjin1109@suda.edu.cn and Hui Yang; qyhui2020@163.com

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Object. To explore occupational stressors among Chinese hospice nurses. **Methods.** A descriptive qualitative approach was used. We conducted semistructured interviews with 30 hospice nurses from 14 cities in China between August 2023 and February 2024. Data were analyzed using conventional content analysis. The study adhered to the COREQ checklist for reporting. **Results.** Hospice nurses perceived themselves as immersed in a persistent “negative energy magnetic field,” emphasizing the pervasive stress they experienced in their work. There are four different levels of occupational stressors among Chinese hospice nurses: (1) individual-level stressors such as difficulty in managing physical symptoms, dealing with futile resuscitations, and struggling with emotional boundaries; (2) organizational-level stressors encompassing insufficient financial support and human resources, negative leadership behaviors, and conflicting philosophies in healthcare; (3) societal-level stressors involving challenges such as avoidance of conversations about death, pragmatism, and implicit communication modes; and (4) acute stressors including patient suicide and sudden patient death. **Conclusions.** Diverse occupational stressors faced by hospice nurses are greatly influenced by culture. Future research should thoroughly examine these stressors at various levels and consider the cultural impacts on the stress experienced by hospice care nurses within a broader context.

1. Introduction

In China, the population aged 60 and above reached 280 million by the end of 2022, constituting 19.8% of the total population [1]. Meanwhile, the incidence of new cases of malignant tumors was 4.064 million, with a rate of 293.91 per 100,000 in 2016 [2]. As the elderly population grows rapidly and the number of cancer patients continues to increase, the demand for hospice care in China is rising. The government has shown considerable interest in advancing hospice care, as evidenced by the issuance of the “Healthy China 2030 Outline,” which explicitly emphasizes the necessity of bolstering the infrastructure of hospice care to ensure

comprehensive healthcare services spanning from prenatal care to end-of-life care [3]. To achieve this goal, the Chinese government launched the first batch of nationwide pilot work on hospice care in five cities in 2017 and subsequently increased the number of pilot cities twice in 2019 and 2023. Despite increased government support for hospice care in recent years, the development of hospice care in China is still in its infancy. This is mainly due to insufficient education about hospice care, inadequate staffing of hospice care teams, and uneven distribution across regions [4, 5].

Caring for terminal patients creates a challenging and high-pressure work environment for hospice nurses. Terminal patients seek more care, comfort, and emotional

support, and hospice nurses play a crucial role in providing these aspects. Hospice care aims to relieve patients' physical symptoms and extends its responsibility to address patients' psychological, mental, social, and spiritual needs [6]. The expectations of meeting diverse needs pose higher demands for hospice nurses. They must not only care for patients experiencing pain and other symptoms but also help them navigate the uncertainty surrounding their death [7]. Additionally, they are expected to fulfill families' various needs while facing potential risks in the process of caregiving, such as providing grief counseling for bereaved family members [8].

Occupational stress is an individual's subjective experience of stressors resulting from the imbalance and mismatch between work demands and response capacities [9]. Previous studies found that excessive occupational stress can have negative impacts on nurses' physical health and emotions during their work, leading to reduced productivity, compromised the quality of nursing care. Excessive occupational stress among nurses can lead to detrimental outcomes for all parties involved: nurses, patients, and hospitals [10–12]. Quantitative studies from Germany [13, 14] and Japan [12] reported that hospice nurses experienced a medium-to-high level of work-related stress, primarily due to main occupational stressors such as high workload, high emotional demands, and chronic exposure to death. One study on hospice nurses in the United States showed that the most significant occupational stressor among nurses was assisting patients and their families in coping with death, followed by workload issues, such as a shortage of human resources and insufficient time to provide psychological support to patients [15]. Additionally, relationships with patients, families, and team members were identified as both stressors and sources of energy for hospice nurses, depending on how they were perceived and managed [16]. Therefore, recognizing hospice nurses' stressors at an early stage and assisting them in effectively coping with and transforming stressors is critically important to improve nurses' psychological health.

Most studies on occupational stressors among hospice nurses have applied quantitative research methods. While quantitative research is helpful for identifying stressors using structured assessment measures, it may overlook significant stressors from nurses' perspectives and fail to consider cultural influences on these stressors [17]. Qualitative research serves to address this deficiency by understanding hospice nurses' occupational stressors from their own perspectives and experiences, aiding in the identification of previously neglected stressors [18]. Compared to Western countries, hospice care in China is in its early developmental stage, and hospice nurses may face specific stressors during this phase [19]. Additionally, stressors are affected by cultural backgrounds [20]. Different countries and regions have different perspectives on dying, death, and the afterlife due to their diverse cultural backgrounds, making hospice care highly culturally diverse. The psychological, spiritual, and social needs of terminal patients vary widely in different regions. The traditional Chinese worldview of life and death has a profound influence on patients' acceptance of hospice

care, their decisions about end-of-life treatment and care, and the way they express their personal care needs, which may affect the occupational stress of hospice nurses to some degree [21]. Specifically, the Chinese death culture is characterized by a "reverence for life and aversion to death," where death is seldom discussed openly as it is still considered taboo and inauspicious [22]. Most Chinese people tend to pursue longevity, rather than the quality of life. This cultural perspective on death causes terminal patients and their families to fear death, pursue treatment at all costs, and hold a negative attitude toward hospice care, viewing it as merely waiting for death [23]. This, in turn, leads to resistance against the care provided by hospice nurses, causing them considerable stress in their work.

To date, no studies to the authors' knowledge have comprehensively examined the occupational stressors experienced by hospice nurses in China. Existing literature has mostly discussed job burnout and compassion fatigue among hospice nurses [24–26]. Deepening our contextual knowledge of this area is crucial for cultivating supportive work environments to manage stress effectively. Therefore, this study aims to investigate the occupational stressors experienced by hospice nurses in China, contribute additional evidence on this topic for other countries, and provide insights for stress management among hospice nurses in culturally similar regions. Additionally, the findings of this qualitative study can lay the groundwork for developing specific stress screening tools and establishing coping strategies.

2. Methods

2.1. Design. A qualitative descriptive approach is beneficial for collecting detailed, direct, and firsthand descriptions of a phenomenon with limited available information [27]. This design is suitable for discovering and understanding a phenomenon, a process, or the perspectives and worldviews of individuals involved in research [28]. Therefore, in this study, this approach was selected to gain a comprehensive understanding of hospice nurses' perceptions regarding occupational stressors. This study was reported following the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist.

2.2. Settings, Recruitment, and Sampling. Participants for this study were recruited through invitations sent to institutions and at conferences. For institutional recruitment, we purposively sampled hospice care institutions in Taiyuan, Suzhou, and Changsha. Prior to entering these institutions, we sent a "Research Opportunities Inquiry at Your Institution" (Supplementary Material 1) to seek permission from administrators. Administrators then introduced the study to hospice nurses and recruited potential participants. For conference recruitment, the interviewer (YW) attended the National Hospice Care Nursing Advances Seminar hosted by the Chinese Nursing Association in July 2023 and the Guangdong Province Hospice Care Service Skills Training Workshop in October 2023. At these conferences,

the interviewer actively invited hospice nurses across China to participate in the study. Following these methods, interested participants were contacted and provided with detailed study information. They were given at least 24 hours to consider whether to participate in the study. Given the relatively limited number of hospice nurses in China and their dispersed distribution, snowball sampling was employed after each interview to invite qualified acquaintances to join the study, aiming to gather more comprehensive data [29]. Furthermore, small gifts were given to the research participants to acknowledge the time and effort they have provided in participating in the research.

2.3. Participants. From August 2023 to February 2024, researchers recruited hospice nurses from fourteen medical institutions nationwide. The inclusion criteria were: (1) having a hospice nursing qualification certificate and possessing more than one year of hospice care experience and (2) consenting to participate in the current study. The exclusion criteria were: (1) nurses who were not in the period of rotation of hospice care or had left this work and (2) standardized training nurses, refresher nurses, and nurse interns. The sample size was determined by the principle of data saturation, ensuring that no new emerging information was obtained [30].

2.4. Data Collection. The interviews were conducted by YW, a female doctoral student in nursing with training in qualitative interviewing, psychological counseling, and specialized hospice nursing. YW completed her master's degree in nursing in Suzhou and is currently pursuing her doctoral degree in nursing in Taiyuan. She audited a two-week specialized hospice nurse training course by the Chinese Nursing Association in Changsha. This background helped her quickly build rapport with participants and grasp cultural cues and dynamics during interviews. After piloting interviews with two hospice nurses and refining the interview guide, the final version covered two main areas: (i) general experiences in end-of-life care and (ii) stressful situations faced by hospice nurses at work. During each interview, further flexible probing and exploration were conducted based on the participants' responses. YW explained the interview purpose and procedures, obtained consent, and scheduled meeting times. Interviews were conducted in a quiet, safe, and private setting. Considering the dispersed nature of hospice nurses and limited financial and human resources, the study utilized both face-to-face and telephone interviews to enhance response rates [31]. All interviews were recorded, and reflexive field notes were taken to capture the researcher's reflections for subsequent interviews. After 27 interviews, data saturation was achieved, with an additional three interviews conducted for confirmation [32].

2.5. Data Analysis. Interviews were recorded and transcribed verbatim within 24 hours. The current study used conventional content analysis to analyze interview data [33].

This method takes a data-driven "bottom-up" approach to analyze data without specific research hypotheses. Instead, it allows researchers to actively identify codes, subcategories, and categories based on participants' responses. Specifically, the first and second authors independently delved into the interview data, repeatedly reading text files and immersing themselves in the context to gain a general sense of the data. Next, they read the text data word by word, condensed, and extracted meaningful units related to stressors of hospice nurses from the text, and then began coding. After the number of codes was saturated, the two authors organized the codes into subcategories and categories based on the connections among code attributes and codes. Lastly, they defined each category and subcategory. To ensure the consistency of the analysis, the research team discussed regularly and reached a consensus on codes, subcategories, and categories throughout the data analysis process.

2.6. Rigor. Guba and Lincoln's principles were adopted to ensure the rigor and trustworthiness of this study [34]. First, this study conducted interviews with hospice nurses from fourteen cities across east, south, west, north, and central China, representing wide-ranging age groups, various lengths of work experiences, different educational backgrounds, and varied professional titles to enhance the diversity of perspectives. Then, two researchers independently coded the data and regularly reported the results to the research group. This approach aimed to avoid the influence of researchers' presumptions on the analysis process and to enhance the credibility of the results. Finally, the first author conducted member-checking, returning research data to participants to verify the accuracy and alignment of the study results with their experiences.

2.7. Ethical Considerations. This study obtained ethical approval from the Ethics Committee of The First Hospital of Shanxi Medical University (Ref: NO. KYLL-2023-021) and the Shanxi Medical University Research Ethics Committee (Ref: 2024002). The researchers explained the purpose of study to the participants and received their consents before interviews. Written informed consent was obtained from all participants prior to the interview. Participants' identifiable information, including personal names and employer names, has been de-identified. All data were collected solely for research purposes and kept confidential and undisclosed to the public.

3. Results

Thirty hospice nurses were interviewed from fourteen cities across China. Researchers conducted in-person interviews ($n = 15$) with hospice nurses from Taiyuan, Suzhou, and Changsha. In addition, virtual interviews ($n = 15$) were conducted with nurses from the remaining cities due to personnel and financial reasons. Each interview took about 45 to 60 minutes. More details on the final participant characteristics are shown in Table 1.

TABLE 1: Characteristics of the participants (N = 30).

Nurses	Gender	Age	Education	Title	Hospice care experience (year)
N1	Female	46	Bachelor's degree	Supervisor nurse	15
N2	Female	37	Bachelor's degree	Associate professor of nursing	3
N3	Female	31	Bachelor's degree	Supervisor nurse	1
N4	Female	35	Bachelor's degree	Supervisor nurse	2
N5	Female	37	Bachelor's degree	Supervisor nurse	1
N6	Female	36	Bachelor's degree	Supervisor nurse	5
N7	Female	37	Bachelor's degree	Supervisor nurse	4
N8	Female	35	Bachelor's degree	Supervisor nurse	1
N9	Female	36	Bachelor's degree	Supervisor nurse	6
N10	Female	33	Bachelor's degree	Supervisor nurse	5
N11	Female	25	Bachelor's degree	Senior nurse	3
N12	Female	33	Bachelor's degree	Supervisor nurse	4
N13	Female	34	Bachelor's degree	Supervisor nurse	4
N14	Female	47	Associate's degree (3 years)	Supervisor nurse	8
N15	Female	38	Bachelor's degree	Senior nurse	7
N16	Female	25	Associate's degree (3 years)	Senior nurse	5
N17	Female	30	Master's degree	Senior nurse	2
N18	Female	33	Bachelor's degree	Supervisor nurse	1
N19	Female	41	Bachelor's degree	Supervisor nurse	2
N20	Female	25	Bachelor's degree	Senior nurse	3
N21	Female	29	Associate's degree (3 years)	Senior nurse	7
N22	Female	26	Bachelor's degree	Senior nurse	4
N23	Female	36	Bachelor's degree	Supervisor nurse	4
N24	Female	33	Bachelor's degree	Supervisor nurse	3
N25	Female	40	Master's degree	Associate professor of nursing	5
N26	Female	25	Bachelor's degree	Nurse	1
N27	Female	27	Master's degree	Supervisor nurse	1
N28	Female	29	Master's degree	Senior nurse	2
N29	Female	39	Bachelor's degree	Supervisor nurse	5
N30	Female	32	Bachelor's degree	Supervisor nurse	4

The “Negative Energy Field” model of hospice nurse stressors (Figure 1) draws on the structure of the “magnetic field” and the concept of “systems thinking.” Systems thinking argue that the only way to fully understand one thing is to understand the parts in relation to the whole [35]. Hospice nurses described feeling surrounded by various stressors in end-of-life care, creating a pervasive sense of being in “negative energy field” (e.g., “This is where many life pains converge, and stress permeates everything.”). Hospice nurses’ perceptions of occupational stressors were categorized into four types: individual-level stressors, organizational-level stressors, societal-level stressors, and acute stressors (see Figure 1). It is worth emphasizing that acute stressors may affect hospice nurses across individual, organizational, and societal levels. Therefore, based on the study findings and researcher reflection, acute stressors are depicted spanning each level in Figure 1. More details on categories, subcategories, and quotes can be found in Table 2.

3.1. Individual Level

3.1.1. Patient Care Difficulties. Terminal patients, who are the primary recipients of hospice care, directly influence hospice nurses through their suffering, leading to distress among the nurses. Specifically, the inability to relieve patients’ physical discomforts and to deal with patients’

complex and ever-changing mental states has contributed to significant stress for hospice nurses.

(1) *Difficulty in Managing Physical Symptoms.* Participants reported that symptoms of terminal patients were complex, and the final stages of diseases are often the most challenging to manage. This not only imposes a significant workload on nurses but also causes substantial stress when patients’ symptoms cannot be effectively relieved.

“Their [the patients’] wish in coming here is to be comfortable. They want to experience comfort during the last stage of life. Patient families also desire comfort, wishing for no pain, no suffering, and no depression. The most significant stress for us is that we sometimes struggle to manage patients’ symptoms despite our best efforts.” (N6).

(2) *Complex and Ever-Changing Mental States.* Mental states of terminal patients are constantly in an unstable condition due to the deterioration of illness and the approach of death. Hospice nurses reported feeling a high level of stress when facing such situations.

“The patients we work closely with are terminal patients. They may have a very bad temper and could suddenly curse

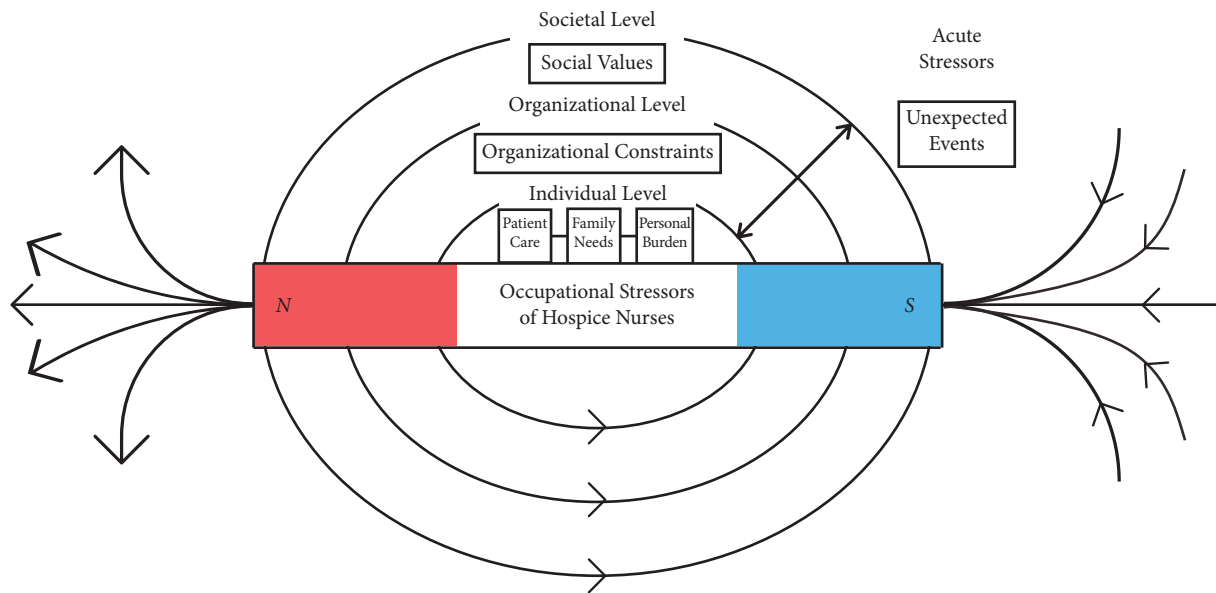


FIGURE 1: The “negative energy field” model of hospice nurse stressors.

or lose their temper while you are providing them with care. They also show negative attitudes toward you. It is not because of your care quality but because they need a place to vent their emotions.” (N8).

(3) *Lack of Standards in Spiritual Care.* Spiritual care is a significant component in hospice care. It is personalized, unstandardized, and requires specific techniques. Moreover, the spiritual needs of terminal patients differ from those of ordinary patients. In addition to enduring physical pain, terminal patients also confront the inevitable risk of death. Many participants expressed that spiritual care is often the most stressful aspect of hospice care.

“Individuals have varied spiritual needs, so there is no single correct answer or set procedures guiding you in providing spiritual care. It [spiritual care] changes all the time. Therefore, it’s quite stressful.” (N5).

3.1.2. *Family Needs.* In Chinese culture, the opinions and attitudes of the family are highly valued, particularly when making critical decisions. Therefore, hospice nurses must consider the feelings of the family when inquiring about patients’ preferences and discussing patients’ conditions and death. Nurses are often asked not to disclose patients’ true diagnosis and prognosis until consent is obtained from their families. This situation has made their work challenging, as the nurses are expected to consider the family’s needs while providing hospice care according to the patients’ preferences.

(1) *Futile Resuscitations.* Under the influence of China’s traditional culture of familism, families might request medical staff to actively resuscitate and treat patients when faced with the impending death of terminal patients. The unnecessary resuscitations conflict with the principles of

hospice care, which involve allowing patients to pass away with dignity, without pain, and the decision to forgo futile resuscitations. Therefore, hospice nurses often experience confusion and stress due to these futile resuscitations.

“Not every patient in our units can leave peacefully because some families persistently ask for resuscitations, possibly influenced by China’s traditional values. These families believe that they must resuscitate their parents to show filial piety and care. I find it painful to witness these resuscitations for terminal patients, but we must comply in most situations. That’s what the family asks for, and we must follow.” (N1).

(2) *Disease Concealment.* The families of patients may request that nurses withhold information about the patients’ actual medical conditions from the patients, seeking to prevent psychological shocks arising from awareness of their illnesses. Concealing these illness conditions has placed additional stress and challenges on the daily care duties of nurses.

“I believe that every patient family who conceals illness conditions from the patients will eventually regret it. While I would suggest not concealing such information, I respect the family’s decisions, and I have no right to interfere. Therefore, I will be more careful in handling these situations and feel stressed in the meantime.” (N8).

3.1.3. *Personal Burdens.* Hospice nurses can experience stressors related to personal factors at work, including worries about insufficient professional knowledge and skills to achieve the goals of hospice care, difficulties in managing nurse-patient relationships, and anxiety and fear about death due to prolonged exposure to patients’ deaths.

TABLE 2: Categories, subcategories, and exemplar quotations.

Categories	Sub-categories	Quotations
	Difficulty in managing physical symptoms	<p>Their [the patients'] wish in coming here is to be comfortable. They want to experience comfort during the last stage of life. Patient families also desire comfort, wishing for no pain, no suffering, and no depression. The most significant stress for us is that we sometimes struggle to manage patients' symptoms despite our best efforts. (N6)</p> <p>Patients have questioned me, "I am here to reduce symptoms. Why are there no solutions? Why can't you do it? What are you doing every day? I don't want to stay here anymore. Do you have any pills to poison me to death?" These questions are constantly shocking. Some patients even say, "Let me die," repeat this over and over. At that moment, you truly feel that the stress has reached its peak. (N10)</p> <p>You watch this situation hopelessly. You want to intervene, to alleviate some symptoms, but you are powerless. (N14)</p> <p>The patients we work closely with are terminal patients. They may have a very bad temper and could suddenly curse or lose their temper while you are providing them with care. They also show negative attitudes toward you. It is not because of your care quality but because they need a place to vent their emotions. (N8)</p> <p>The emotions of terminal patients are very unstable. You can easily sense their feelings of upset or depression. I find it challenging to talk with them. I don't know how to relieve their emotions, how to identify their problems, or how to assist them in expressing or releasing repressed emotions. (N12)</p> <p>The ever-changing emotions, symptom discomforts, and the lack of safety among the patients all contribute to bringing me stress. For instance, they may request me to help with a haircut, but after 10 or 15 minutes, they would say, "I'm dizzy now. I don't want to see you now. I want to stay alone." (N20)</p> <p>One day during the night shift, you might have a heart-to-heart talk with the patient. They would hold your hands and say, "Thank you for giving me strength and warmth." Then the next day, the patient doesn't recognize or remember you, or they even start to resist you. You don't know the reasons for it, which is very frustrating. (N23)</p> <p>Individuals have varied spiritual needs, so there is no single correct answer or set procedures guiding you in providing spiritual care. It [spiritual care] changes all the time. Therefore, it's quite stressful. (N5)</p> <p>We need to fulfill patients' emotional or spiritual needs before their deaths. I don't know how to take care of those patients or flow into their hearts. This can be stressful. (N8)</p> <p>Not every patient in our units can leave peacefully because some families persistently ask for resuscitations, possibly influenced by China's traditional values. These families believe that they must resuscitate their parents to show filial piety and care. I find it painful to witness these resuscitations for terminal patients, but we must comply in most situations. That's what the family asks for, and we must follow. (N1)</p> <p>Many patient families consent to hospice care, but when the patients are close to death, their families regret, change their minds, and force you to intervene. The families can't bear the judgments or infamies from society, so they ask for resuscitations and continue letting the elders live with pain and suffering. This situation is very stressful, but I can't make any changes. (N7)</p> <p>I believe that every patient family who conceals illness conditions from the patients will eventually regret it. While I would suggest not concealing such information, I respect the family's decisions, and I have no right to interfere. Therefore, I will be more careful in handling these situations and feel stressed in the meantime. (N8)</p> <p>It's very common for patient families to request that we conceal the real conditions of patients, not informing them about the limited time they have left. I find it challenging and distressing to provide hospice care while concealing. (N19)</p> <p>There are situations where I find myself unsure of how to handle them, possibly due to a lack of capabilities and techniques. I feel that I haven't learned enough or don't possess sufficient knowledge, and this can be quite stressful. (N5)</p> <p>Hospice care has high requirements for nurses, not only in terms of working experience but also in terms of personal insights and approaches to handling problems. I often find that my knowledge and techniques are still insufficient, which can be quite stressful when facing certain issues. (N12)</p> <p>I think that our job is kind of cruel. You need to build emotional relationships with patients, but every relationship has the same outcome—they will pass away. Therefore, I think it's very cruel and very sad for us, hospice nurses. This requires a strong psychological state. Every time I think of their leaves, I feel deeply sorrowful. (N11)</p> <p>I take care of them, listening to music together, going for walks, and investing both effort and emotions. We then build strong emotional relationships. When they pass away, it feels akin to losing a family member. It's a deeply sorrowful experience. You know that they will have a such end, but you can not control your tears. (N23)</p> <p>I believe that working in the hospice unit can be challenging because, at times, emotions are difficult to control. After witnessing patients' deaths, I occasionally find myself losing hope in life and feeling that things are meaningless. (N14)</p> <p>I contemplate my own mortality, acknowledging that one day I will experience the same fate. I also think about the eventual loss of my family members. There is no solution; I must accept it. Every time these thoughts raising, I feel hurried. (N26)</p>
	Complex and ever-changing mental states	
Patient care difficulties	Lack of standards in spiritual care	
	Futile resuscitations	
	Disease concealment	
Family needs		
	Lack of knowledge and skills	
	Struggle of emotional boundaries	
Personal burdens		
	Death anxiety	

TABLE 2: Continued.

Categories	Sub-categories	Quotations
Organizational level	Organizational constraints	<p>I feel stressful every day. The government provides minimal funding, and we receive low pay. Why am I still dedicated to this job? This is a crucial question many people are facing. The most basic reality is that no matter how passionate you are about hospice care, you must survive. While money may not be your top priority, you need to ensure, at the very least, your daily necessities. (N7)</p>
	Insufficient financial support and human resources	<p>Working here, there is an imbalance between your effort and your pay. In our hospital, as hospice nurses, we are the busiest but receive very low pay. (N16)</p> <p>Personnel are very lacking. Many hospice nurse specialists are not specially providing hospice care. Most of them must take on responsibilities in other wards and provide hospice care during their free time. So, this is very challenging. In fact, all our cases involving spending our own time and money to care for patients. (N8)</p> <p>Actually, hospice care is an additional responsibility. While tending to patients in the hospice wards, there are other patients you need to take care of as well. Initially, we didn't have the responsibility of hospice care, but now we have extra specialized tasks due to the addition of hospice wards. I currently handle it with my devotion. (N23)</p> <p>The head nurse frequently criticizes and scold us in the morning meetings. Working in a department where death is a common occurrence is already quite stressful. Having to face criticism early in the morning adds to the stress throughout the day. I find this situation very frustrating. (N2)</p>
	Negative leadership behaviors	<p>I feel like the head nurse doesn't really care about their duties. However, when their supervisor asks for task outcomes, they turn to you and request information. What can you do? You can't say it's not your responsibility. They never specify what I should do and what I don't need to do, which is quite annoying. They seem unwilling to take responsibility but frequently ask you to handle tasks. (N16)</p>
	Conflict philosophies in healthcare	<p>I think there is another major stressor. Hospice care has only been practiced well by nurses but not by doctors. The medical philosophies are mismatched. Many doctors have not recognized hospice care, and this is disadvantageous to cooperate as a team. (N16)</p> <p>Nurses have a higher passion for hospice care. But as a nurse, your voice is often not heard. After all, doctors have all the rights to decide how to treat patients, and they are seen as having a higher status by patients. Nurses face many stresses during their practices, especially when doctors don't recognize your work. (N19)</p>
	Avoid conversations about death	<p>China has a long history of Confucianism for thousands of years. Due to its influence, we only discuss births and lives but not deaths. Many people still avoid discussing or facing death; thus, the death education is very challenging. People generally have a low acceptance toward it. Hospice care is about discussing death, but no one is willing to engage in conversations about death. Therefore, this job is quite stressful. (N3)</p>
Societal level	Social values	<p>When we tried to promote hospice care to the patient, they did not accept it very well due to the impact of our Chinese traditional cultures. They would say that death bring bad luck, then they always avoid any conversations about it. People always misunderstand about hospice care, and this misunderstanding make you feel stressful. (N23)</p> <p>We provide some comforting services to the patients, such as meditation and aromatherapy, but they perceive these as ineffective for their illness. You meticulously prepare those services, but it doesn't come with positive feedback, then you would feel stressed. I even started to question the purpose of this job. (N6)</p> <p>They [patient families] don't care about it [comforting care] because they believe that it's not necessary or beneficial for their parents [the patients]. Comforting care is perceived as lacking practicality. I think this is detrimental to our work and feel a little frustrated. (N13)</p>
	Implicit communication mode	<p>The implicit expression of Chinese people makes it hard for them to express their emotions. It's very difficult for you to let them speak out. Hospice care encourage patients to reflect on their emotions and feelings, but we just can't do it. It's hopeless, and I don't know how to do it. (N2)</p> <p>Chinese people are often reserved, and many of them may not be adept at expressing themselves or do so in an ambiguous way. So, we can't have some deep conversations, and this could be another stress in my work. (N21)</p>
	Patient suicide	<p>We have a patient committed suicide during the night, without a single sign. You can't figure out why this happened. After that, I become very concerned about the patients, especially about their psychological problems. (N6)</p>
Acute stressors	Unexpected events	<p>One older patient suddenly passed away. I made rounds of the ward, and the nursing assistant did as well, but the patient suddenly died without warning. During our meeting, the head nurse and doctors questioned me if I did the scheduled word inspections and if I checked their breaths. I just stood there and started self-doubting. It's very stressful. (N11)</p> <p>Patients could pass away peacefully in their sleep, with stopped heartbeats and no breaths, even if they were not in a severe condition. When patient families touched their bodies, they found them cold. Overwhelmed with grief, they rushed to the nurse station, crying and eventually breaking down. You can imagine how stressful it was for us (N16)</p>

(1) *Lack of Knowledge and Skills.* Some hospice nurses believed that they lacked professional knowledge and skills, and they worried that they were not competent enough to provide high-quality care services to patients.

“There are situations where I find myself unsure of how to handle them, possibly due to a lack of capabilities and techniques. I feel that I haven’t learned enough or don’t possess sufficient knowledge, and this can be quite stressful.” (N5).

(2) *Struggle of Emotional Boundaries.* Because of the challenges in controlling the level of emotional involvement with patients, hospice nurses frequently encounter difficulties in handling their emotions after patients pass away, resulting in adverse emotional outcomes.

“I think that our job is kind of cruel. You need to build emotional relationships with patients, but every relationship has the same outcome—they will pass away. Therefore, I think it’s very cruel and very sad for us, hospice nurses. This requires a strong psychological state. Every time I think of their leaves, I feel deeply sorrowful.” (N11).

(3) *Death Anxiety.* The hospice nurses reported experiencing anxiety related to death and questioning the meaning of existence, after repeatedly facing the shocks of patient deaths.

“I believe that working in the hospice unit can be challenging because, at times, emotions are difficult to control. After witnessing patients’ deaths, I occasionally find myself losing hope in life and feeling that things are meaningless.” (N14).

3.2. Organizational Level

3.2.1. *Organizational Constraints.* In a team of collaborative members with diverse personalities and varied professional backgrounds, differences in opinions on patient treatment or care arise, and consensus communication is lacking. Hospice nurses also reported stressors stemming from the lack of resources and support for nursing work from management, including negative leadership behaviors.

(1) *Insufficient Financial Support and Human Resources.* Participants expressed that the current state of hospice care and the policy environment in China are still in their infancy. The funding and human resources for conducting hospice care are insufficient, resulting in a lack of adequate financial support for nursing work. Hospice nurses invest a significant amount of time and effort but receive comparatively minimal remuneration, which becomes a stressor for them.

“Personnel are very lacking. Many hospice nurse specialists are not specially providing hospice care. Most of them must take on responsibilities in other wards and provide hospice

care during their free time. So, this is very challenging. In fact, all our cases involving spending our own time and money to care for patients.” (N8).

(2) *Negative Leadership Behaviors.* Many participants indicated that head nurses, as pillars for nursing staff, exhibit negative leadership behaviors during the management process. For example, scolding nurses in public and adopting an unsupportive attitude toward their work, which are significant stressors for the nurses.

“The head nurse frequently criticizes and scold us in the morning meetings. Working in a department where death is a common occurrence is already quite stressful. Having to face criticism early in the morning adds to the stress throughout the day. I find this situation very frustrating.” (N2).

(3) *Conflict Philosophies in Healthcare.* Participants expressed that, at the current stage, China is actively cultivating specialized hospice nurses but lacks a focused training program for hospice specialized doctors. This has led to a certain level of mismatch in the medical and nursing philosophies in actual work. Many doctors have not provided sufficient support for hospice care, creating obstacles in the practice of hospice nursing care.

“Nurses have a higher passion for hospice care. But as a nurse, your voice is often not heard. After all, doctors have all the rights to decide how to treat patients, and they are seen as having a higher status by patients. Nurses face many stresses during their practices, especially when doctors don’t recognize your work.” (N19).

3.3. Societal Level

3.3.1. *Social Values.* China’s traditional culture, with Confucianism as the principal part, has shaped the values, beliefs, customs, and behaviors of Chinese people. It also has a profound influence on people’s attitudes towards hospice care.

(1) *Avoid Conversations about Death.* Chinese culture emphasizes the idea of “emphasizing birth and downplaying death.” Specifically, people rarely directly talk about death and even view death as a taboo and an inauspicious topic. This perspective has led to misunderstandings and rejections toward hospice nurses and their work, causing stress for the nurses.

“When we tried to promote hospice care to the patient, they did not accept it very well due to the impact of our Chinese traditional cultures. They would say that death bring bad luck, then they always avoid any conversations about it. People always misunderstand about hospice care, and this misunderstanding make you feel stressful.” (N23).

(2) *Pragmatism*. The Chinese style pragmatism emphasizes the most direct application and short-term benefits. Some terminal patients considered certain comforting care in hospice care as lacking practicality for treating illness. Therefore, they often express attitudes of skepticism and reluctance, and it has created a certain amount of stress for hospice nurses.

“We provide some comforting services to the patients, such as meditation and aromatherapy, but they perceive these as ineffective for their illness. You meticulously prepare those services, but it doesn’t come with positive feedback, then you would feel stressed. I even started to question the purpose of this job.” (N6).

(3) *Implicit Communication Mode*. In Chinese culture, people usually tend to follow the principle of restraint. They adopt implicit and veiled ways of expressing thoughts and emotions, further forming a culture that values reserved emotions. In hospice care, patients and their families often have ambiguity and flexibility in their expressions, presenting a challenge in nurse-patient communication. Nurses often find it difficult to accurately discern the genuine needs of patients and their families.

“Chinese people are often reserved, and many of them may not be adept at expressing themselves or do so in an ambiguous way. So, we can’t have some deep conversations, and this could be another stress in my work.” (N21).

3.4. Acute Stressors

3.4.1. *Unexpected Events*. When unexpected events occur, such as patient suicide or sudden patient death, nurses may experience acute stress across individual, organizational, and societal perspectives in the short term. Specifically, these events may result in blame from the patient’s family and self-doubt at the individual level; questioning from nursing managers or doctors about their patient monitoring abilities at the organizational level; and undermining the perceived value and acceptance of hospice nursing at the societal level.

(1) *Patient Suicide*. Hospice nurses have the mission of facilitating a peaceful death for patients. When confronted with situations where patients choose suicide to end their pain and suffering, hospice nurses are profoundly shocked, experiencing emotions such as anger, fear, and self-blame. Society also questions the professionalism of nurses.

“We have a patient committed suicide during the night, without a single sign. You can’t figure out why this happened. After that, I become very concerned about the patients, especially about their psychological problems.” (N6).

(2) *Sudden Patient Death*. Terminal patients may experience sudden deaths due to the severity of their illnesses. Families of the patients often struggle to accept these sudden deaths.

Additionally, doctors and nursing supervisors may attribute them to the nurses’ dereliction of duty. Hospice nurses, in turn, express feelings of self-doubt and self-blame regarding the sudden deaths of patients.

“Patients could pass away peacefully in their sleep, with stopped heartbeats and no breaths, even if they were not in a severe condition. When patient families touched their bodies, they found them cold. Overwhelmed with grief, they rushed to the nurse station, crying and eventually breaking down. You can imagine how stressful it was for us.” (N16).

4. Discussion

In this study, we employed a descriptive qualitative approach to directly investigate hospice nurses’ occupational stressors in their own words. Additionally, we used conventional content analysis, a data-driven “bottom-up” approach, to capture insights directly from participants. This method mitigates researcher bias and provides novel perspectives on the data. This study delves deeply into the occupational stressors from the perspective of hospice nurses. They perceived themselves as being immersed in a persistent “negative energy magnetic field,” highlighting a pervasive sense of being engulfed by layers of stress. Within this field, they not only encounter various stressors but are also surrounded by an insidious energy that casts a pall over the entire work environment. This depiction underscores the ubiquity of stress and conveys the complex and profound challenges that nurses face in their work. The field itself emits a vibe of “Like charges repel each other,” further emphasizing the intensity of the stress and its inescapable nature within the work setting.

The study found similar results to previous studies, indicating that the inability to alleviate patients’ physical symptoms [36], the complex and variable psychological states of terminally ill patients [37], the inability to adequately meet patients’ spiritual needs [38], and a lack of self-knowledge and skills [39] can contribute to a certain level of psychological stress for nurses. Furthermore, our findings indicated that the absence of emotional boundaries in nurses is also a major source of stress. Hospice care is a practice that involves both professionalism and emotion, making it difficult for nurses to entirely separate professional relationships from personal ones, especially within the context of relationally oriented Chinese culture [40]. The lack of emotional boundaries during patient care causes significant emotional distress (e.g., compassion fatigue and vicarious trauma) for hospice nurses [41, 42]. Establishing emotional boundaries is a key strategy in mitigating emotional distress. Although challenging in clinical practice, there are methods to maintain these boundaries. For instance, hospice nurses can prevent and alleviate emotional distress through self-awareness and mindfulness techniques [43]. Organizations should enhance emotional training, regularly assess mental health, and provide professional psychological support when needed [44]. The current literature offers limited practical techniques for hospice nurses to maintain emotional boundaries, indicating a need for future research in this area.

It is worth noting that some special requests from patients' families, such as futile resuscitation and concealment of the condition, also often put nurses under great pressure. Influenced by Chinese traditional familism, family decisions often take precedence over the wishes of terminally ill patients themselves. In addition, due to the traditional filial piety values in China, making every effort to save lives is generally regarded as the epitome of "filial piety" [45]. Consequently, family members often request medical personnel to actively resuscitate and treat patients who are on the brink of death. This often leads to overtreatment of terminally ill patients, in particular the use of cardiopulmonary resuscitation. This conflicts with the hospice care principle of allowing patients to die with dignity and without pain, and abandoning end-of-life resuscitation, which also causes stress for hospice nurses. The second stressor from patients' families is concealing the medical condition. Due to China's cultural background, families often choose to conceal a patient's terminal condition. [46]. It is assumed that disclosing the true condition aggravates the patient's condition and leads to tension and anxiety. Whether maintaining confidentiality regarding the illness or disclosing it to the patient presents a common source of stress and dilemma for hospice nurses. In China, families play central roles in hospice. Consequently, initiatives such as life and death education for the public should be implemented to gradually raise awareness of hospice care throughout society.

From an organizational perspective, insufficient funding and human resources are also stressors, consistent with the findings of Ling's research [4]. Furthermore, our findings showed that negative leadership behaviors have adverse effects on hospice nurses' emotions and motivations. The Chinese social context is characterized by collectivism and influenced by traditional Confucian thought, with deep-rooted concepts of hierarchical respect, causing significant distress to nurses due to negative leadership behaviors [47]. Additionally, conflicts between medical and nursing philosophies are also a prominent source of stress for hospice nurses. In the development of hospice care in China, nursing has taken the lead over medicine, with the nursing profession placing a stronger emphasis on the philosophy of hospice care. For instance, since 2019, the Chinese Nursing Association has been conducting training for hospice care specialty nurses, whereas there is currently no specialized training for hospice care doctors in China. The nursing profession also started offering degrees and graduate education in hospice care studies in 2024 [48]. Overall, hospice care competency training for doctors in China is insufficient. However, in clinical practice, doctors usually assume a leading role, leading to patient identification and trust in doctors' decisions. Conflicts between medical and nursing philosophies in such situations create stress for nurses.

From the social perspective, former studies emphasized how the public's fear of death puts pressure on hospice care nursing in China [39]. Within the Chinese cultural background, our study is the first to identify that pragmatism and implicit communication modes impact on the work of hospice nurses. Firstly, unlike the philosophical concept of

pragmatism, Chinese pragmatism places greater emphasis on "practicality" and stresses "immediate effectiveness" [49]. Some humanistic practices in hospice care, which patients believe are of no substantive or immediate benefit to their illness, often lead to questioning and reluctance to accept, which to some extent also causes distress for nurses. Furthermore, the lack of freedom of thought and expression formed by China's long-standing feudal autocracy and constraints from Confucianism deeply affects all aspects of Chinese society. "Harmony" is the core of the Confucian system of benevolence and a significant aspect of Chinese philosophy of life [50]. The concept of "harmony" dictates subtlety and indirectness in language expression. Chinese people often exercise restraint in expressing thoughts and emotions, forming a national psyche that values subtlety and implications. In hospice care, the subtlety and flexibility exhibited by patients and family members create communication pressures between nurses and patients, as nurses often struggle to identify the true needs of patients and family members.

Our findings also revealed that sudden events such as the unexpected death or suicide of patients represent a particularly acute source of stress for hospice nurses. The sudden death of a patient due to rapidly worsening conditions can be shocking for families. Doctors and nursing managers may consider whether nurses' rounds and observations of the condition were timely and appropriate. The societal perception of nurses' professional identity is compromised. Hospice nurses may consequently experience doubt and self-blame, subsequently facing significant psychological pressure from various sources in the short term. Moreover, hospice care strives to assist terminal patients in experiencing a peaceful end of life. However, when patients end their lives through suicide, it shakes the belief systems and sense of mission of hospice nurses, leaving them feeling pressured and apprehensive. The American Association of Suicidology has coined the term "Clinician Survivors of Suicide Loss," referring to professional caregivers who experience the suicide of their own patients [51]. Clinician survivors bear the dual roles of caregiver and bereaved, thereby placing tremendous pressure on them, such as undergoing self-review or feeling defeated. We recommend that clinics should improve emergency management in response to sudden incidents in hospice care and pay close attention to the psychological state of hospice nurses, offering proactive support as needed.

5. Limitation

Due to practical constraints, this study focused exclusively on female hospice nurses, thereby limiting the exploration of gender differences in stress perceptions and experiences. However, we ensured diversity in the interview sample by including nurses of various ages, work experience levels, educational backgrounds, professional titles, and geographic regions. Additionally, this study was conducted within the unique cultural context of China, which may limit the transferability of the findings to other distinct cultural settings.

6. Strengths and Implication

Despite these limitations, our study has several strengths compared to previous studies. First, culturally relevant stressors found in this study may be applicable to countries with similar cultural backgrounds. Hospice care is deeply connected to local death culture. It is also necessary to consider cultural influences when exploring stressors among hospice nurses across different countries. Second, the results of this qualitative study can serve as a foundation for creating targeted stress screening instruments and formulating effective coping mechanisms. Lastly, the study highlights that hospice nurses experience stressors such as unmet psychological or spiritual patient needs and conflicts in healthcare philosophies. This underscores the importance of proactively enhancing interdisciplinary collaboration within the hospice care team, comprising physicians, nurses, psychologists, social workers, and others, to better address the diverse needs of terminally ill patients. These efforts will promote a healthier work environment for hospice teams, benefiting terminal patients and the healthcare system as a whole.

7. Conclusion

This study provides a detailed understanding of occupational stressors among hospice nurses in China, which fills the gaps identified in previous research. The findings also describe how diverse and interconnected stressors may complicate their end-of-life care duties. Our evidence-based recommendations can inform the development and implementation of targeted strategies to cope with these stressors in hospice nurses across China and similar cultural contexts in the Asia-Pacific region. Future research should focus on fully understanding occupational stressors by examining stressors at various levels and considering the influence of culture on the stress experienced by hospice care nurses within the broader context.

Data Availability

Due to the ethical obligations of the authors, the data used in this study are not available.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Supplementary Materials

Supplementary Material 1: Research Opportunities Inquiry at Your Institution. (*Supplementary Materials*)

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